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THE ROLE OF SURGERY IN THE TREATMENT OF PEPTIC ULCER.¹

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THIS lecture is limited to a discussion of the role of surgery in the treatment of chronic peptic ulcer.

The most important and perhaps the only uncontradicted statement with regard to peptic ulcer is that in connexion with its anatomical and physiological location. These quite typical ulcers occur only in that portion of the gastro-intestinal tract which may be exposed to the action of hydrochloric acid.

Although the distinctions between them are not very clear cut, it has been customary to recognize three types of peptic ulcer: acute, subacute and chronic, according to the length of time they have been in existence.

The acute phase lasts for about two to three weeks, and, except for the rare acute penetrating ulcer, the ulcerative process involves the mucosa and submucosa only. In the subacute phase ulceration invades the *muscularis mucosæ*. The ulcer is said to be chronic in about six or seven weeks, by which time there is considerable destruction of the outer coats of the viscus.

In other words, this so-called chronic ulcer is really an acute ulcer in which healing has been delayed, and is in no way chronic in the sense that tuberculous and syphilitic lesions are chronic.

The distribution of chronic ulcer is fairly characteristic; it is almost invariably solitary and is nearly always found along the line of the lesser curvature, within four inches of the pylorus. Subacute ulcers, however, are more irregular in their distribution; they are often single, though as many as half a dozen may occur at the same time. The great majority are situated also along the lesser curvature.

Although multiple acute ulcers or erosions are scattered in considerable numbers widely and irregularly over the interior of the stomach, two

¹A post-graduate lecture delivered at the Prince Henry Hospital, Sydney, on August 5, 1939.

main groups, the fundal and the pyloric or pathway erosions, may be recognised.

This distinction extends further than a mere anatomical location; for, whilst the former originates as a hæmorrhage in the mucosa, the latter usually appears as a greyish circumscribed membrane covering a saucer-like denudation of the surface of the mucosa. It is from the latter group that chronic ulcers are believed to originate.

A discussion on the surgical management of chronic peptic ulcer cannot be profitably presented without due consideration of those factors which cause the lesion and prevent healing.

Experimental Production of Gastric Ulcer.

Although the pathogenesis of peptic ulcer as seen in man has not yet been definitely established, certain conclusions may be drawn from the experimental work of various surgeons, and it is upon such data that modern surgical procedures are chiefly based.

A summary of the somewhat extensive literature may therefore prove of interest.

Pure gastric juice has the capacity of digesting all living tissues, including even the gastric wall, provided always that the exposure is adequate. Matthes's view is that the cells are first killed by the hydrochloric acid and subsequently digested by the gastric ferment.

In the case of the gastro-intestinal tract the result of such digestion is the production of a progressive defect which is the exact anatomical counterpart of a peptic ulcer as seen in man.

The mucous membrane adjacent to the lesion, as well as that of an associated Pavlov pouch, displays an inflammatory reaction similar to that of the "antrum gastritis" described by Konjetzny. Under normal conditions the mucosa of the stomach and duodenum is not digested because the membrane is not exposed to pure gastric juice.

The evidence supporting these conclusions is briefly as follows:

1. If segments of duodenum, jejunum, ileum or colon, or such organs as spleen, kidney or pancreas are implanted into artificial defects in the stomach wall of dogs so that the implants are subjected to the digestive action of the gastric contents, they are not digested, provided always that their blood supply is not interfered with.

2. The capacity of pure gastric juice to digest living tissues may be strikingly demonstrated by the insertion of like implants into somewhat similar defects in the wall of a Pavlov pouch constructed from the *pars intermedia*, whereby the implants are subjected to the action of pure undiluted juice. The resistance of these intestinal implants is diminished *seriatim* from duodenum to colon. Moreover, in certain cases, especially if the gastric pouch is large, the mucosa itself may be digested so that a perforating ulcer results.

3. Pure gastric juice¹ of normal pepsin concentration, but whose free acidity is reduced to thirty

clinical units (0.109%) or less, has no digestive action, whereas juice having a concentration of free acid of fifty units (0.182%) or more has a very pronounced effect irrespective of the concentration of pepsin.

You are all no doubt familiar with Claude Bernard's experiment of introducing the leg of a living frog through a fistulous opening into the lumen of a dog's stomach. Such experiments, together with various modifications, have been repeated *in vitro*.

Somewhere about forty units or 0.15% of free hydrochloric acid has been found to be the critical level at or above which living tissue is digested.

It is significant that the acidity of the normal gastric content rarely rises above this level, whereas the higher values, approximating that of pure juice, are commonly found in the early stages of the life history of peptic ulcer cases.

The crucial question therefore arises: under what conditions does such a content appear?

For fuller information on this subject I would direct your attention to a paper entitled "A Critical Inquiry into the *Ætiology of Chronic Peptic Ulcer*", which was published in *THE MEDICAL JOURNAL OF AUSTRALIA* of May 14, 1938.

The relatively greater importance of hydrochloric acid in the digestion of living tissue would suggest that the term "peptic ulcer" is a misnomer, and such ulcers should be rechristened "acid ulcers"; attention would thereby be drawn to the more important constituent of the gastric juice.

Case Report.

I am indebted to Dr. E. B. Jones, Director of Pathology at the Prince Henry Hospital, for the notes of a recent case illustrating *ante mortem* digestion (acute perforating ulceration) of both the œsophagus and the fundal area of the stomach.

Clinical History.

The patient, a male, aged nine years, was admitted to hospital on June 27, 1939. It was stated that he had been ill for ten days prior to admission with sore throat, feverishness and vomiting. A rash had appeared three days previously. He had had whooping cough seven years and chickenpox three years previously.

On examination the patient was seen to be very ill. Some dyspnoea and small spots on the abdomen similar to a faded measles rash were present. A systolic murmur was present in the heart; the breath sounds were tubular over the bases of both lungs. Very few bronchitic râles were heard.

The patient's condition deteriorated; he appeared very toxic. The ward tests revealed the presence of sugar in the urine, and an estimation made at 4 p.m. on June 28, 1939, showed the blood sugar content to be 236 milligrammes per 100 cubic centimetres. On this date there was rigidity of both arms and legs, more pronounced in the arms. All reflexes were increased and the bilateral Babinski response was present. The patient was quite unresponsive. He died on June 30, 1939, at 8.30 a.m.

Post Mortem Examination.

The body was that of a male child, aged nine years. There was considerable pallor of the face and a faded rash was present on the trunk. The right lung was voluminous and some early pleurisy was evidenced by the slight ground-

¹Free acidity of 110 to 140 units.

glass appearance of the pleura. The pleural cavity was normal. Some collapse of the base of the left lung was present. No abnormality was seen in the left pleural cavity. The auricle was extremely dilated and was filled with a large *ante mortem* and *post mortem* clot. The other chambers of the heart appeared normal, as were also the valves and vessels. The peritoneal cavity contained several pints of blood-stained fluid, in which numerous lobules of fat could be seen.

About two inches from the cardio-oesophageal junction the oesophagus, for a distance of about one inch, was necrotic, and portion of the oesophageal wall had disappeared. In the cardia of the stomach, on the anterior surface towards the lesser curvature, the stomach wall was necrotic over a diameter of about one and a half inches, and portion of the wall had sloughed away (see Figure 1). No sign of any food was found in either the thoracic or peritoneal cavity. No vascular disturbances were observed in the small intestine, but approximately half-way along the ileum an intussusception had occurred and about two inches of bowel had become invaginated. No other abnormality was found in the bowel. The liver was congested. The spleen was slightly enlarged and the Malpighian bodies were somewhat conspicuous. The kidneys appeared slightly congested, but showed no evidence of abnormality.

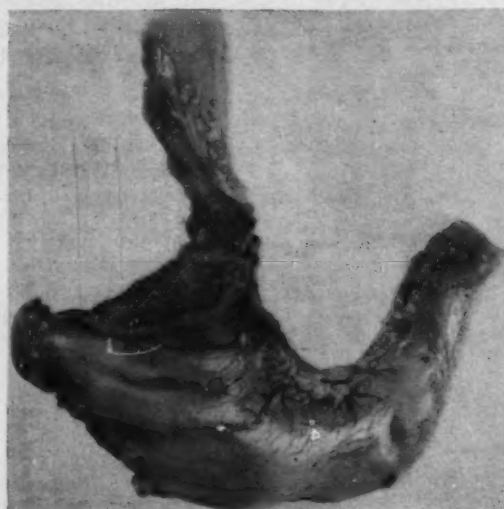


FIGURE 1.

Ante mortem digestion of both oesophagus and fundal area of stomach (posterior view).

When the calvarium was removed the brain was seen to be a dusky purplish colour, owing to the intense engorgement of superficial cerebral vessels. This was especially pronounced over the cerebellum. On section no macroscopic abnormality was seen in the brain.

Microscopic Examination.—No changes of special significance were to be seen in the pancreas. A somewhat diffuse blurring of the histological picture was probably due to *post mortem* changes. The glomeruli, tubules and interstitial tissues of the kidneys showed no special changes. There was some congestion of the liver, but there were no changes of special note. Malpighian bodies were conspicuous in the spleen. Slight congestion was present, but no special changes were observed.

Treatment of Peptic Ulcers.

From a clinical viewpoint peptic ulcers should be divided into medical, borderline and surgical groups.

The medical group comprises those ulcers in which the history does not suggest a lesion of long duration (under five years) and in which there is no evidence of complications; the motor function of the stomach must be good, with no excessive mechanical deformity and no history of profuse and recurrent hæmorrhage. Failures in as many as 10% of cases may be expected in this group; and if failure is experienced after adequate medical treatment the case should be relegated to the surgical group.

Borderline cases comprise the following: those in which the adequacy of prior medical treatment may be questioned or in which moderate hæmorrhages have occurred; those in which the lesion is of long duration, in which considerable mechanical deformity is present, or in which a moderate pyloric obstruction has resulted from spasm or inflammatory oedema rather than from cicatricial contraction. Medical failures may be expected in fully 50% of such cases, and when this occurs they should be placed in the surgical group.

In cases that are clearly surgical from the onset, complications, such as pyloric obstruction, repeated major hæmorrhages, penetration or perforation, have developed.

The operations that have been devised for the treatment of peptic ulcer are legion, and the only rational conclusion that can be arrived at after a survey of the literature is that of Professor J. M. T. Finney: "The stomach is an extremely viable organ."

The modern tendency to regard all peptic ulcers as one disease has given rise to a great deal of confusion, and this has been further augmented by the recent Continental practice of advocating one operation (partial gastrectomy) as the routine surgical procedure for all gastric and duodenal ulcers.

It cannot be too strongly emphasized that gastric and duodenal ulcers are distinct diseases, differing in ætiology, course and prognosis, and therefore demanding a fundamentally different outlook as regards surgical treatment.

The gastric mucosa possesses some specific resistance to the digestive activity of the fundal glands, and the development of a gastric ulcer appears to be in some way due to local loss of such resistance. (Compare Dr. Charles Bolton's classical experiments and the work of Dr. C. Keith Simpson.)

Conversely, if an abnormal retention of food should occur in a short, high, oblique, transverse stomach, the continuing secretion of gastric juice will raise the acidity of the gastric contents until it approaches the acidity of the pure secretion.

In gastric ulcer the dominating problem is the uncertainty whether the lesion, especially if large, is or may develop into a carcinoma, whereas in duodenal ulcer the ever-pressing need is to reduce the excessive acidity, whether this arises from retention due to pyloric stenosis or from excessive continuous secretion.

Gastric Ulcers.

From the point of view of surgical treatment gastric ulcers may be somewhat artificially divided

into four groups: (i) small ulcers involving the lower two-thirds of the lesser curvature, (ii) saddle-shaped ulcers giving rise to hour-glass deformity, (iii) penetrating ulcers, and (iv) cardiac or "letter-box" ulcers.

1. *Small Ulcers (Fixed or Mobile) Involving the Lower Two-Thirds of the Lesser Curvature.*—The operation of choice for these "trouser-button" ulcers is a local resection, either by knife or cautery, combined with a posterior gastro-jejunostomy.

Balfour turns back a flap of the peritoneal coat of the stomach until the ulcer is exposed. The base of the ulcer is then punctured and destroyed with a cautery from without, the resulting gap in the stomach wall is sutured, the peritoneal flap is replaced and the operation is completed by the performance of posterior gastro-jejunostomy (see Figure II).

Such a procedure permits of a sharp spoon being inserted through the ulcer base whereby adequate tissue may be removed for biopsy purposes.

This type of ulcer is not usually associated with the same high acidity as is the non-stenosing duodenal ulcer. If, however, the acid curve is abnormally high, if the crater is larger than three-quarters of an inch in diameter or if occult blood persists whilst the patient is undergoing a strict medical régime, the operation of partial gastrectomy should be substituted. Patients with ulcers situated at or within half an inch of the gastric aspect of the pylorus should also be subjected to partial gastrectomy, owing to the fact that these ulcers frequently prove to be malignant.

2. *Saddle-Shaped Ulcers Giving Rise to Hour-Glass Contraction of the Stomach.*—In the second group the surgical treatment will be governed by various considerations, such as the presence or absence of pyloric stenosis, the exact site of the stricture, fixation of the base of the ulcer to other viscera, and, last but not least, the sex and age of the patient.

The operations of choice are gastro-gastrostomy, with or without gastro-jejunostomy, in the event of an associated pyloric stenosis, or partial gastrectomy.

As 90% of the cases of hour-glass stomach occur in women, the preference is naturally for gastro-gastrostomy. The ulcer is not as a rule excised unless a definite crater is demonstrable.

In "segmental" or "sleeve" resection an annular portion of the stomach containing the ulcer is excised and the divided ends are united terminally to reform the viscus (see Figure II); but this operation is found to cause great disturbance of both tone and motor power of the viscus.

3. *Penetrating or Mouse-Hole Ulcers.*—

Penetrating or mouse-hole ulcers have extended from the lesser curvature to involve the posterior wall; the ulcer crater may be as large as a five shilling piece, and the base is frequently found to be adherent to the pancreas, liver *et cetera*. In these cases patients respond poorly or not at all to medical treatment; but a well-planned operation gives immediate and complete relief, which, with reasonable after-care, is usually lasting. As the technical difficulties of dealing directly with such an ulcer may be more easily and safely overcome by the performance of a partial gastrectomy of the retrocolic

Pólya type, this operation becomes the method of election (see Figure III).

The penetrating area is well defined by means of swab pressure and encircled by the finger, and the ulcer border is separated from the pancreas or liver by means of scalpel or scissors, the base being left *in situ*. The hole in the posterior wall of the stomach is temporarily closed by suture, the surface of the ulcer is cleansed with alcohol (never cautery) and the resection is proceeded with.

4. *Cardiac or "Letter-Box" Ulcers.*—Cardiac or "letter-box" ulcers involving the upper third of the lesser curvature occur commonly in the vicinity of the œsophageal opening. These ulcers, frequently

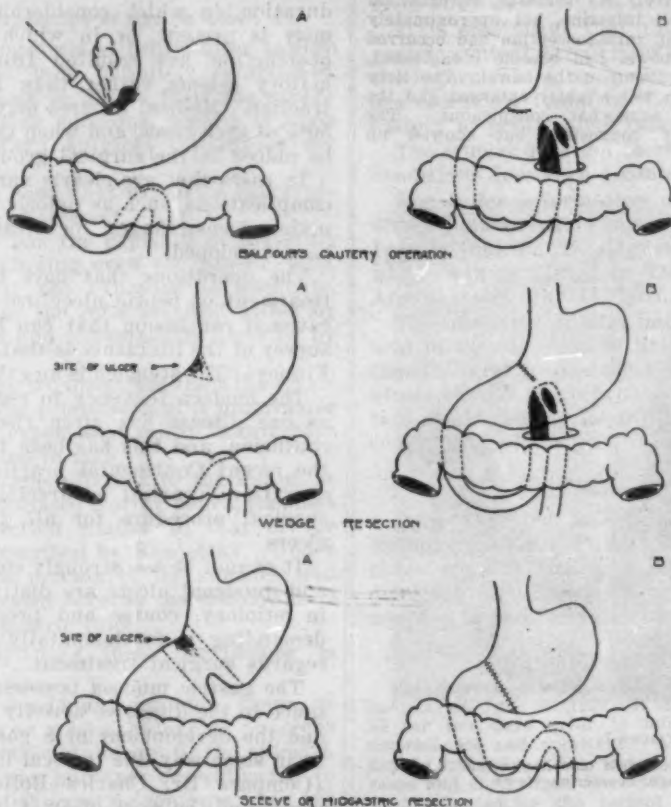


FIGURE II.

penetrating in character and often associated with a duodenal or "trouser-button" ulcer, are particularly common in men between fifty and sixty years of age.

Surgical access necessitates resection of the sternal attachment of the left seventh costal cartilage in accordance with the method of Mikulicz and frequently demands an additional incision below the left breast in order that the seventh, eighth and ninth ribs may be divided.

Victor Pauchet's "groove resection" differs from Pólya's operation in that a tongue-like extension, including the ulcer, is removed from the lesser curvature (see Figure III).

I have treated only three patients belonging to this particular group—one man and two women. All the patients were aged over fifty years, and both female patients had achlorhydria.

The man was cured by Nordenbos's procedure—gastro-jejunostomy combined with gastrotomy, the rubber tube passing across the lumen of the stomach into the efferent jejunal loop (transgastric jejunostomy).

Of the women, one was cured by medical measures and the other by jejunostomy.

Estimation of the Severity of a Gastric Hæmorrhage.—Let me say one word with regard to "bleeding ulcers". It was formerly the custom to make repeated examinations (every two to four hours) of both blood pressure and hæmoglobin percentage in order that the degree of a hæmorrhage might be estimated and any recurrence noted.

More recently the estimation of both blood volume and plasma volume have come into vogue; the error of delayed blood dilution has thus been eliminated. For example, a sudden loss of half the total blood volume would cause no immediate fall in the hæmoglobin percentage, whilst a blood volume estimation would at once register the extent of the loss.

The estimation is made as follows:

About 10 cubic centimetres of a 2% solution of Congo red in distilled water are slowly injected intravenously and after five minutes a specimen of blood is withdrawn, oxalated and centrifuged.

The concentration of the dye in the plasma is now compared colorimetrically with a known dilution of the dye injected, and from this the plasma volume may be calculated.

Portion of the aspirated blood is drawn into a hæmocrit tube and centrifuged for twenty minutes in order that the relative volume of corpuscles and plasma may be determined.

Duodenal Ulcer.

The junction of pylorus and duodenum is indicated on the peritoneal surface of the stomach by a thin white line; to the gastric side of this lies a venous ring (the "pyloric vein" of the late W. J. Mayo), formed by an anastomosis of the veins of the greater and lesser curvatures. Although these two landmarks do not coincide, for practical purposes they will serve to indicate the dividing line between stomach and intestine.

Gastro-jejunostomy is a simple, safe and most efficient operation for the purpose for which it was originally designed, that is, as a short circuit to overcome the mechanical obstruction of an old pyloric (possibly duodenal) stenosis. In cases of duodenal ulcer with stenosis this operation may advisably be combined with sequestration or infolding of the ulcer.

Although at the present day there is a general unanimity amongst gastro-enterologists that mechanical obstruction demands surgical relief, unfortunately there is not the same uniformity of opinion that the

correct treatment of non-stenosing duodenal ulcer should be primarily medical.

During the past quarter of a century the treatment of this latter group has been gradually transferred from the surgical to the medical side of our institutions, until nowadays the best surgical opinion always upholds a sane conservatism. This swing of therapeutic opinion has been largely brought about by three factors: (i) a suitable diet plays a much more important part in the continuous neutralization of hyperacidity than the administration of alkaline powders; (ii) a fractional test meal has proved to be a most efficient compass for shaping the course of therapy; (iii) the results of

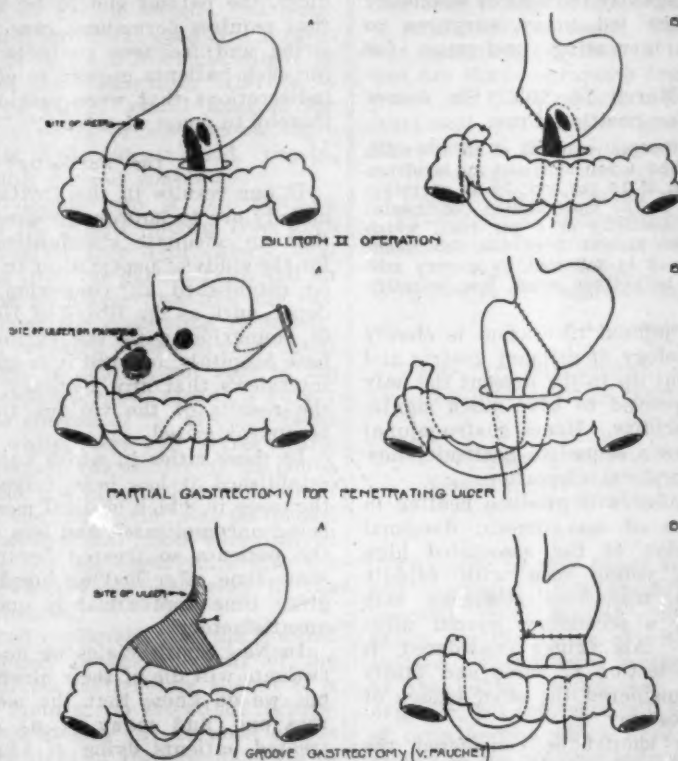


FIGURE III.

medical treatment may be adequately checked by repeated radiological examinations.

In spite of these improvements in technique, cases are not infrequently met with in which either the patient suffers from severe or major recurrent hæmorrhages (involving the loss of one or more pints in a few minutes) or medical treatment has repeatedly failed; in such cases operative measures should be advocated.

There can be no doubt that in Australia sequestration of the ulcer, followed by gastro-jejunostomy, is still the method of election of a large number of surgeons.

Until a decade ago this operation held pride of place in the treatment of all cases of chronic duodenal ulcer; but more recently the fear of secondary gastro-jejunal ulcer has led many surgeons to develop a gradually increasing preference for partial gastrectomy.

In *The Lancet* of March 16, 1935, Sir James Walton summarized the position thus:

I feel strongly that the routine replacing of an operation with a mortality of less than 1 per cent, and an incidence of gastro-jejunal ulceration of 3.9 per cent by an operation which even in the hands of the most skilled Continental surgeons still carries a mortality of 6 per cent, which does not entirely free the patient from the subsequent gastrojejunal ulceration and is followed by a very real risk of severe anæmia, is neither sense nor scientific surgery.

The cause of gastro-jejunal ulceration is closely bound up with the ætiology of primary gastric and duodenal ulceration; but up to the present the only factor that has been proved to have much significance is high gastric acidity. Hence gastro-jejunal ulceration is most often a sequel to gastro-jejunostomy performed for duodenal ulceration.

Although this operation will produce healing in the majority of cases of non-stenotic duodenal ulcer, the neutralization of the associated high acidity, especially in young men with rapidly emptying, short, high, transverse stomachs, may prove inadequate and a secondary jejunal ulcer is prone to develop. All things considered, it appears that faulty selection of cases and faulty judgement must be considered the chief causes of failure in gastro-jejunostomy.

Partial gastrectomy should be considered the operation of choice when the patient suffers from major recurrent hæmorrhages, or for young men with pronounced hyperacidity, hypermotility and rapidly emptying stomachs; but for old men and for women gastro-jejunostomy will suffice.

In *The Australian and New Zealand Journal of Surgery* of October, 1935, Sir Hugh Devine drew attention to the distinction between these two types of duodenal ulcer, and stated that in his opinion gastro-jejunostomy "could not cure the 'acidic' type of ulcer".

The most effective method of partial gastrectomy in such cases is to include the first part of the duodenum; but when the ulcer is a penetrating one on the posterior wall it may be more prudent to adopt Professor Hans Finsterer's technique and divide the prepyloric portion of the stomach some

one and a half inches proximal to the sphincter and perform a high Pólya gastrectomy. The ulcer thereby is left in a cul-de-sac of duodenum removed from contact with acid chyme, and may be relied upon to heal without delay.

A gastrectomy sufficiently radical permanently to reduce acid production below the ulcer-producing level must not only remove at least three-quarters of the stomach (the whole of the pyloric segment, together with a large area (55% to 60%) of the acid-secreting surface) but must also possess an efficient stoma (anastomosis) to permit of efficient neutralization of the gastric by the intestinal juices.

Finally, once having had an operation for peptic ulcer, the patient should be under a life sentence that requires permanent care in diet, physiological living and frequent contacts with his physician; for such patients appear to glory in those dietetic indiscretions that were previously impossible, and thereby to court disaster.

The "Follow-Up" Clinic.

If our results in the treatment of this common malady are to improve progressively, it is essential that an adequate standardized "follow-up" clinic for the study of peptic ulcer in all its aspects should be established in connexion with some central depot, such as the Board of Health, or, failing this, in connexion with the various metropolitan and base hospitals, because it is only by serial personal interviews that any accuracy in the estimation of the results of the various forms of therapy can be approximated.

In those cities in which such a scheme has been established it has been revealed that in spite of the cases in which medical measures were employed being uncomplicated and less severe, "almost all of the patients so treated became unsatisfactory at some time after leaving hospital, and that at any given time approximately one-fourth of them are unsatisfactory".

In New South Wales we do not know how many patients will die of their ulcers as the years go by; but we do know that the medical mortality is a real one, and many of us can recall medically treated patients dying of hæmorrhage or perforation some months after leaving hospital.

From the records of an adequate "follow-up" clinic information should become available as to which patients are suitable for a medical régime and which are not. Early operation on the latter would save not only time but lives as well. Only by such a scheme does it seem possible to formulate standards to guide us in selecting patients for operation and in choosing which type of operation to employ for individual patients.

Commentary.

The manner in which gastro-jejunostomy promotes healing of an ulcer appears to be dependent upon two factors: first, the mechanical one, whereby an efficient outlet from the stomach is established (pyloric stenosis thus being counteracted), and

secondly, the physiological action through which the acidity of the gastric contents is reduced owing to an inflow of alkaline jejunal contents.

The technical success of gastro-jejunostomy depends in the main part upon the position of the stoma in the stomach, and secondly upon the exact point selected in the jejunal loop for the anastomosis. Whenever possible the posterior "no-loop" vertical method should be adopted, and the opening should be large, not less than two to two and a half inches in length, and reaching always to the greater curvature. The advocates of this operation claim 85% of cures, whilst the opponents put the figure at round about 65%.

In cases of non-stenosing duodenal ulcer it is still unproved whether the excessive acidity is of cephalic (vagal) or of gastric origin. Gastrectomists have assumed a hormonal (gastrin) origin; but a valuable clue as to its true origin might be forthcoming if one of the biochemists attached to the department of pathology would analyse the gastric secretion in a series of such cases, more especially as regards hydrochloric acid, pepsin, glucoprotein and visible mucous content.

Approximately a decade ago J. C. McCann removed the whole of the pyloric antrum from dogs and found that thereafter free hydrochloric acid generally disappeared from the gastric juice and an injection of histamine no longer produced the customary response. About the same time, Steinberg, Brounger and Vidgoff repeated the above experiment and looked for changes in acidity, not only in the remaining part of the stomach, but also in a Pavlov pouch made from the mucosa of the viscus. These observers found that whilst there was no free hydrochloric acid in the stomach the acidity of the pouch was not changed by the operation.¹ Furthermore, if "surgical drainage of the duodenum" was performed in addition, so that the duodenal juices were drained into the ileum and could not regurgitate into the stomach, the acidity was unchanged even in the main cavity of the stomach.

The usually accepted explanation of the lowered acidity commonly found in the remnant of the stomach left after partial gastrectomy is that it is dependent upon four factors: (i) intestinal regurgitation through a large stoma, (ii) removal of the exciting chemical stimulant of the second phase of gastric secretion, (iii) removal of a varying amount of the fundal glands (at a maximum 62.5%), and (iv) the fact that undigested food passed into the intestine from the rapidly emptying stomach exerts a far less stimulating effect on gastric secretion (intestinal phase) than does normal chyme.

More recently, Hill O'Brien and Wilhelmj showed that the reduction of acidity following partial gastrectomy in dogs was much greater than could be accounted for by dilution and neutralization alone, and, further, that when a Pavlov pouch was formed and its secretion was collected, more acid

secretion occurred when the pylorus was left *in situ* than when it was removed. Hence a possible explanation of the failure of "physiological gastrectomy".

On the vexed question of continuous secretion we know extremely little. Henning and Norpoth maintain that in a healthy subject the flow ceases a few hours after the onset of sleep; but when a subject with duodenal ulcer is examined, secretion throughout the night of a highly acid fluid is usually demonstrable. There is some experimental evidence indicating that such secretion owes its origin to stimulation of the gastric secretory fibres of the vagus and hence may be abolished by an adequate injection of atropine.

The more one sees of the surgical treatment of duodenal ulcer, the more one queries the rationale of present-day methods. The more commonly used test meals are very low in their secretagogue effect and are thus inadequate tests of the acid-secreting power of the stomach. Further, the customary fractional test meal of gruel is directed towards the chemical phase of gastric digestion, and the modern surgical treatment is essentially an excision of the hormone-producing area.

Practically all the evidence available in connexion with the production of a duodenal ulcer points to the primary fault being connected with the parasympathetic or vagal mechanism.

MENTAL CONDITIONS ASSOCIATED WITH CARDIO-VASCULAR AND RENAL DISEASE.¹

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THE title of this paper is used in preference to one suggested; this employed the term "cardio-vascular renal disease", and implied a clinical entity, the discussion of which would be extremely limited. This is now included as only one aspect of the subject which has little that is new or original; but reference will be made to certain lines of investigation which have been carried out with regard to the possible influence of mental disorders on the cardio-vascular and renal systems, and which suggest profitable lines of research in the aetiology of the psychoses.

The subject therefore can be considered from two aspects: firstly, those mental conditions which arise directly from disease of one or other of these systems, and secondly, those mental states which give rise to certain changes, physiological or mechanical, in the proper functioning of these systems. It may be mentioned here that there is no distinct psychiatric clinical condition which is characteristically associated with any disorder of cardio-vascular or renal function, although the use

¹It should be noted, however, that the quantity of juice secreted by the pouch on the same test meal after removal of the pyloric antrum, was reduced during the first three hours to less than half the response in the intact stomach.

¹Read at a meeting of the New South Wales Branch of the British Medical Association on September 28, 1939.

of such a term as "*folie Brightique*" might suggest it. The principal mental conditions found are the confusional state and delirium in the acute stages of the disease and progressive mental deterioration in the chronic stage.

It is proposed to consider the diseases of the two systems separately and then to deal with those changes which may arise in either system as the result of some psychiatric condition.

Cardio-Vascular Disease.

The Blood Vessels.

The most common disorder with which the psychiatrist comes into contact connected with the blood vessels is arteriosclerosis, particularly in its cerebral form. Cerebral arteriosclerosis may be a part of a general condition and associated with changes in the kidney, or it may exist more or less independently. It is a disease of later life and is typically accompanied by progressive mental deterioration which results in a profound degree of dementia. In the earlier stages the symptoms may range from those of a mild neurasthenia with loss of concentration, irritability, headaches, slight impairment of memory and undue fatigue on slight exertion to a moderate degree of confusion with some clouding of perception, fleeting delusions, restlessness and emotional instability. Convulsions of an epileptiform character also may occur. It is possible that the prodromata are really neurasthenic and depend on exhaustion of the nervous system from improper nutrition of the nerve cells and faulty elimination of fatigue products. They certainly reveal no features to distinguish them from a typical neurosis.

The confusion varies in intensity according to the degree of advancement of the original disease. In some cases it is so pronounced that excitement, resistiveness, unreasoning aggressiveness, complete disorientation and faultiness in habits are present. That this is not a dementia is seen by the periods in which the patient reestablishes contact with his environment, converses rationally and recovers his mental clarity. However, it may be, and often is, the precursor of that mental decline which leads to complete deterioration of the intellectual faculties, memory, orientation and behaviour. In many instances the progressive cerebral ischaemia leads to impairment of the cerebral function before actual blocking of the vessel occurs. Reminiscence and confabulation are common early symptoms, and may be mistaken for the usual dotage or "anecdote". The patient becomes self-centred and hostile to change. Such delusions as do occur at this time are loosely constructed, and paranoid trends are often present. Periods of depression, morbid anger and apprehensiveness and even outbursts of violence not infrequently occur.

As the true dementia develops the patient often becomes more amenable and obeys instructions in a childishly complacent fashion. He tends to wander around in an aimless and purposeless manner and has to be guarded from common dangers. Both mental and physical enfeeblement are evident,

memory for recent events has faded, intellectual capacity is grossly limited and moral sense may be lost or perverted, so that he comes into conflict with the law. His habits deteriorate, incontinence and untidiness are common. Querulous petulance and obstructiveness give place to dulness, apathy and a condition to which the term "amentia" or mindlessness might well be applied. He has entered upon his seventh age, and his social and economic usefulness has ended.

The vascular lesions which may accompany this condition produce symptoms from the mechanical interference with certain nerve tracts and association fibres, and these manifest themselves in ways which might be interpreted as indicative of mental disorder. This applies not only to hæmorrhages but also to thromboses, softening and cerebral oedema. The emotional lability of the thalamic patient may be mistaken for a depressive state, and the moral lapses which frequently occur may be regarded as deliberate or as an indication of moral deficiency. Even aphasia, agnosia, apraxia and palilalia may be misinterpreted as purely functional conditions.

Hæmorrhage may be a catastrophe in cerebral tissue; but it may have beneficial results elsewhere, and this may be an opportune time to quote the case mentioned by Devine⁽¹⁾ in which an extreme loss of blood resulted in recovery from a psychosis.

This was the case of a woman of thirty-six years, who had suffered from attacks of depression over a period of twenty years. She was hopeless and pessimistic in her attitude, apathetic to her children and had made several attempts at suicide. She complained of severe rectal pain, was obstinately constipated, and one day, while defæcating, ruptured a large rectal vein and became almost pulseless and unconscious. The hæmorrhage persisted for three days before it was controlled. Her mental condition immediately improved and she made a complete recovery.

A similar reaction was seen in a case of acute confusion, apparently as the direct result of a severe hæmatemesis. It certainly does appear that bleeding may have its advantages, although there is no evidence that it is specific for any particular mental disorder. It is most likely to be of benefit in cases of delirium or confusion associated with arterial hypertension.

Other conditions of the blood vessels play little part in the causation of mental disorders although two are worthy of mention. In the first place there are the aortic lesions. A comparatively small number of cases of aortitis have been seen; but it has been noted that in these there is a definite tendency to the development of paranoid ideas. Whether this is due to the lesion itself or is part of a syphilitic cerebral condition is not clear; but the incidence of persecutory delusions, suspicion and irritability is unduly high. Aortic insufficiency also is frequently accompanied by symptoms of mental disorder, and these are more commonly met with than in any other form of heart disease. Delusions may occur even without loss of compensation; but more frequently with the breakdown the patient begins to lose his mental control and disorientation becomes obvious.

The second condition is that described by Gowers⁽²⁾ as vaso-vagal attacks. These occur most commonly in women, often in association with menstruation. They are characterized by an initial sensation of epigastric discomfort, the exact nature of which the patient is unable to describe. This is followed by disordered action of the heart, which may be slowed, irregular or unduly rapid. There is a close similarity between these attacks and those of *petit mal*, and they may be mistaken for the latter. The patient remains perfectly still and consciousness is not lost; but there is a feeling of unreality in which the surroundings appear distant and everything seems like a dream. The extremities are cold and cyanosed and the face may be pale or flushed. This condition is one worth bearing in mind, although admittedly it is not common. It responds to the usual treatment for epilepsy, for which it may be mistaken, by bromides and "Luminal".

An interesting theory has been put forward by Ferris⁽³⁾ with regard to the influence of the carotid sinus on the neuroses. He believes that this exerts a major regulatory influence on the tonus of the autonomic nervous system. The carotid sinus reflex is obtained by a sudden release of the occluded common carotid artery low in the neck, a sudden increase in the intrasinal pressure thus being caused. This results in syncope and also in various manifestations which are similar to those found in the neuroses. These are: fatigue, loss of ambition, mental depression, palpitation and emotional instability. Furthermore, Ferris found that these symptoms also occurred independently of spontaneous and induced syncopal attacks. From this evidence he came to the conclusion that the autonomic nervous system does play a part in the development of a neurosis and that there may well be a physical basis for many conditions which have been regarded as purely functional. At the very least it is an interesting theory with possibilities which would repay further investigation.

The Heart.

The degenerative cardiac lesions, by their accompanying failure of compensation and consequent cerebral dysfunction, produce varying degrees of confusion with restlessness, incoherence and clouding of consciousness. They are in no way distinguishable from other forms of confusion of physical origin. There is the obvious physical basis, amelioration of which produces a corresponding improvement in the mental condition. The principal difficulty met with in such cases is that the cardiac trouble is greatly aggravated by the excitement and over-activity of the patient, and thus, in too many instances, the prognosis is most unfavourable and the onset of the confusion represents the beginning of the end.

Another mental state, in which the difference from this is largely one of degree only, is that of delirium. In this there is less restlessness and the patient can generally be kept in bed without any great difficulty.

Medical treatment can be carried on more successfully and the outlook is correspondingly more favourable.

Apart from these, which can be regarded as the mechanical effects of disease of the heart, there may be psychological results from the discomfort and the worry and anxiety about the probable outcome and the necessity for leading a more restricted form of life. These may produce anything from a minor neurosis to pronounced depression. Irritability is a common accompaniment of such conditions, but difficulty in concentrating, listlessness, lack of energy and other symptoms of a neurosis are not infrequent. These depend on the associated mental stress and not on the physical factors. Prolonged brooding over the disability may induce more serious mental states, such as paranoid conditions, depression with suicidal attempts or acts of impulsive violence. An investigation by Lewis⁽⁴⁾ into the relation between cardiac failure and psychic phenomena revealed that a very small percentage of such patients suffered from mental symptoms. In only 1% of cases did a psychosis occur, and the principal symptoms included depression, fear, ideas of persecution, hallucinations and excitement. Lewis considered that the low incidence was due to the factor of individual personality difference. It is quite possible that these patients might have suffered from psychoses irrespective of the cardiac condition.

Cardiac pain may cause such distress and apprehensiveness of subsequent attacks that any form of neurotic manifestation may result. In addition, as commonly occurs when persistent or frequently recurring pain is present, changes may take place in the disposition, resulting in moodiness and surliness. In angina the incidence of psychiatric abnormality has been shown by Bourne⁽⁵⁾ to be surprisingly high; he reported that it was present in 76% of cases of angina of effort, in every investigated case of spasmodic angina of effort, in 90% of cases of *angina innoccens*, and in 33% of cases of organic heart disease without pain. Of 57 cases of cardiac pain, neuroses were evident in 34 and depression in six. The occurrence of anxiety states or hysteria was unduly high in *angina innoccens*. It was also noted that worry and mental stress preceded the onset of pain in many instances.

Alterations in the rhythm of the heart are often productive of neuroses. Morbid preoccupation with the disordered cardiac action may result in feelings of anxiety and apprehension, which in turn may produce a typical neurotic state. Considerable distress often occurs, for example, with the onset of extrasystoles, and it may be very difficult to reassure a patient convinced that his end has come. These sensations are exaggerated by general depression of the health, by fatigue and by emotion. When numerous they may occasion actual physical distress, especially if they are grouped together. Anxiety may be profound in these circumstances, and faintness, coldness of the extremities and

sweating may result. To a lesser degree paroxysmal tachycardia may have similar results. For a person suddenly to become aware of his heart's action and to realize that it is beating irregularly is essentially a disturbing experience and one which may well lead to introspection. It is from this that the mental symptoms arise, rather than from any direct effect the arrhythmia itself may have on the cerebral function.

In the more severe forms of cardiac irregularity definite mental disorders may occur, as Osler⁽⁶⁾ has pointed out, particularly in reference to heart block. In this condition convulsive attacks may be present in which there is nothing to distinguish them from *status epilepticus*. It appears that the actual rate of the heart has some relationship to the severity of the mental disorder. Whitehorn⁽⁷⁾ has drawn attention to this in a report on a series of electrocardiograph studies in which he found that the heart rate in psychotics was steadier than the normal under various forms of emotional stress, whereas that of neurotics was less steady.

The Blood.

The principal blood condition with which we are concerned is pernicious anæmia. Once again the common mental disorder which may arise is the confusional state, as might be expected, from impairment of the quality of the cerebral circulation. Pernicious anæmia is more common in men than in women; but the reverse is the case when psychotic symptoms develop. This has been shown by Herman,⁽⁸⁾ who found that there were 40 patients with mental symptoms out of 255 consecutive patients suffering from this condition. These included 29 women and 11 men. In 72.5% of these cases there was neurological involvement of the spinal cord, which must be regarded as an indication of the degree of damage done to the nervous system generally; 35% of the patients suffered from acute confusion, 17.5% showed paranoid trends, 15% had a manic-depressive psychosis and 12.5% had organic mental deterioration.

The figures given by this observer are rather higher than those commonly quoted for the incidence of psychoses in the course of pernicious anæmia, being 16% as opposed to the usual figure of 4%. Other mental symptoms may be present apart from those already mentioned. These are delirium, hallucinations and dementia, in that order of frequency. The early symptoms of cerebral involvement are a ready fatigue, disinclination for exertion, some irritability and possibly the development of a suspicious attitude.

Other blood conditions play little part, except accidentally or incidentally, in the causation of mental disorder. Obviously, cerebral anæmia, the result of a profuse hæmorrhage from some part of the body, will differ in no respect in its psychiatric sequelæ from a similar condition arising from any other cause.

Mention may be made here of the experiments of Marañon⁽⁹⁾ on the hæmoclastic crisis. This consists of a reduction of the refractive index, increased

coagulability, leucopenia and a fall in the blood pressure due to the circulation of amino-acids and the earlier products of proteolysis. This can be produced by the ingestion of 200 grammes of milk, and it is interesting to note that it is most pronounced in certain psychoses and occurs in 94% of schizophrenics. While investigating this phenomenon Marañon also noted that small injections of adrenaline were capable of producing all the bodily signs which would accompany pronounced emotional conditions. The subject is, in effect, sensitized to a pronounced true emotional reaction.

No other cardio-vascular conditions have any significant relationship to the disorders of the mind.

Renal Disease.

In the acute stages of inflammatory conditions of kidneys there may be an exaggeration of the accompanying toxæmia to such an extent that a toxic delirium or a toxic confusional state may result. These are not distinguishable from similar states already described in connexion with other organic diseases. They are characterized by restlessness, resistiveness, faultiness, incoherence and complete disorientation.

In the more chronic forms of nephritis the symptoms are present over a longer period, there is less confusion, the evidence of toxæmia is less pronounced, and it is only after a fairly long time that any considerable physical disability arises. It is during the earlier stages of the chronic conditions that obvious mental symptoms make their appearance in a certain number of cases. Ideas of suspicion, resentfulness, irritability and even violence may be present. States of acute excitement, usually of a transitory nature, also occur, together with delusions of persecution; and it is to this symptom complex that the term "*folie Brightique*" is applied. There are no mental conditions which are pathognomonic of renal disorders, and the various signs and symptoms found are those which may arise in any other form of toxæmia.

The confusion of uræmia is similar to that previously described and differs from it in no respect. In this condition epileptiform convulsions may also occur. Acute mania has been reported in several cases as a precursor of the typical coma. Headache and persistent insomnia may be early symptoms which are likely to be overlooked unless a routine examination of the urine is made.

Forming an interesting group are the cases of unsuspected chronic renal disease in which a rapid cardiac failure and fall in blood pressure are accompanied by severe mental disorders in the shape of insomnia, excitement, motor restlessness and excessive garrulity. These patients may become acutely delirious and die in the course of a few days.

In chronic interstitial nephritis with arteriosclerosis, the so-called "cardiovascular-renal disease", mental manifestations which arise have already been described.

Osler⁽¹⁰⁾ draws attention to an interesting feature of chronic nephritis. This is that almost all the patients have been of a nervous temperament throughout life. Occasionally one is found who is supposed to be an exception; but analysis often shows that such patients are "outwardly" calm but "inwardly" tense. With the development of the disease the nervousness and irritability increase. The patient worries about trifles and becomes extremely trying to his family and associates. In rare instances a true psychosis develops; but this is usually a late phenomenon, and is often associated with cardiac failure.

Apart from the above there is nothing distinctive about the mental reactions to renal conditions.

Mental States and Cardio-Vascular and Renal Function.

Various forms of minor or major mental states may produce symptoms suggestive of disease of the cardio-vascular or renal systems, and in addition certain changes in the blood or urine may manifest themselves and apparently be the result of the mental state rather than the cause of it.

Cardio-Vascular Manifestations.

Hysteria is the great imitator of all physical conditions, and many of its expressions may be very similar to organic disease of one of these systems. Cyanosis or blanching of the extremities may simulate Raynaud's disease, hæmorrhagic stigmata may appear to be a true purpura, dyspnoea and tachycardia may suggest cardiac incompetence, and so on.

The same applies to the anxiety neurosis in a lesser degree. The characteristic trilogy of symptoms—tremors, feelings of apprehension and palpitation—appears to have no physical basis, endocrine, cardiac or autonomic.

In the same category is the condition first described by da Costa as occurring among soldiers in the American civil war. This is the irritable heart of soldiers with a persistent tachycardia, the pulse rate being 90 to 120 per minute or more. It apparently developed as a result of the rigors of a strenuous campaign, exposure and under-nourishment. It was associated with dizziness, precordial pain and dyspnoea. Recovery usually took place with rest. It is possible that the anxiety and fears accompanying the constant exposure to danger played a large part.

Bradycardia has been found to be present in certain mental states and to be particularly frequent in epilepsy, depressive states and conditions of extreme hypochondriasis.

The myocardium itself may suffer damage from the sudden and violent strain imposed upon it by fear, anger, worry, and so on, in the course of a purely neurotic condition, and thus an organic lesion may arise and lead to serious consequences.

Sometimes an alight degree of hypertrophy is found in neurotic subjects also; and Potain's studies of the effects of left-sided neuritic lesions of the brachial plexus on the myocardium support the assumption that the nervous condition is responsible for the cardiac enlargement.

It must be borne in mind that compensation for a cardiac lesion may be quite satisfactory until some mental stress or shock is experienced, when decompensation may set in abruptly. Palpitation, which objectively may have existed for years, becomes evident and distressing to the patient. He awakens at night with dyspnoea and very soon the signs of venous stasis are present.

Many cardiac conditions which formerly were believed to be functional in origin are now realized to have an organic basis through the advancement of knowledge of metabolism. There still remain many disorders, some of which have been mentioned, for which no satisfactory physical explanation can be offered.

It is often difficult to correlate cause and effect and to say how much depends on the physical condition and how much on the mental state. Certain changes in the blood pressure accompany some psychoses, and when improvement takes place in the mental condition normal systolic and diastolic readings are obtained once more. In the case of those depressive states which so frequently occur during the involutional period in both men and women, such changes are common. In women it often takes the form of hyperpiesis with "hot flushes", throbbing in the head, dyspnoea on exertion and occasional sensations of vertigo. In men low blood pressure readings are more constant and are associated with feelings of languor, mental and physical inertia, difficulty in concentrating and general loss of interest. These symptoms are similar to those of a typical neurasthenia; but an element of depression with some feelings of futility and inadequacy serves to distinguish them. It is not suggested that these changes are necessarily caused by the mental condition or that they are responsible for it; but they are of too frequent occurrence to be entirely disregarded.

Gottlieb⁽¹¹⁾ found what he considered to be a significant relationship between the systolic and diastolic blood pressures in schizophrenia. He believed that the high correlation coefficient found in this psychosis indicated a lack of function of the sympathetic system. The same author made a study of the peripheral venous blood pressure and found that the mean individual variation was less in this mental disorder than in normal people; this showed that the autonomic reactions of these patients were less facile. In normal people, as the level of the blood pressure changes, the systolic and diastolic pressures retain a constant relationship. This implies that either the vascular bed has lost its elasticity of function and the calibre of the vessels changes with difficulty, or if vascular changes occur, they occur uniformly throughout the organism. There is no determinable relationship between the venous and arterial blood pressure variations or between the degree of peripheral cyanosis and the level of the former.

Rest is often a factor in the amelioration of hyperpictic conditions, and, as might be expected, in certain mental states in which physical and

mental activity is at a low ebb, there is a corresponding drop in the blood pressure. This is particularly noticeable during the phase of extreme inhibition in schizophrenia and in the very retarded depressives. Similarly, there may be a rise in blood pressure in manic states and in all conditions of excessive restlessness and excitement.

Examination of the blood itself may reveal definite changes in its chemical constituents and its volume in certain cases of mental instability. Here again most investigations have been made on subjects of schizophrenia. Brice⁽¹²⁾ noted a significant depression of the level of the fatty acid and cholesterol content of the blood in schizophrenia, most pronounced in apathetic and stuporose patients. The cholesterol content has been reported to show variations also in manic-depressive psychoses, and Schube,⁽¹³⁾ using a modified Myers-Wardell method, noted that the normal range was from 110 to 195 milligrammes *per centum*. Of 33 patients with mania, 28 had a blood cholesterol level below normal, whereas 14 of 38 depressives had a level above normal and 12 had a level below it. The cholesterol level depends on decreased physical and mental activity and therefore the restlessness of the acute mania and the general retardation of the depressive must be reflected in this.

Cholic acid is another constituent which has been shown to vary in certain circumstances. The normal cholic acid value varies from 0.6 to 2.2 milligrammes *per centum*. In a series of psychotics investigated by Adell⁽¹⁴⁾ it ranged from 0.4 to 4.5 milligrammes. It was found to be abnormally high in the actual psychosis, but low in patients who had recovered or had had remissions. From this Adell concluded that the acute phase of mental disease was associated with liver damage. It is possible that some hepatic dysfunction does exist, but it hardly seems justifiable that such an inference as this should be drawn from the facts available.

The serum calcium content has also been shown to vary considerably in different mental conditions. The normal value is from nine to eleven milligrammes *per centum*; but Atkin⁽¹⁵⁾ stated that in schizophrenia and manic and epileptic psychoses it was high, while in depressive states and *dementia paralytica* it was low. It appears that there is a possible relation between the blood calcium level and the emotional tone.

In a discussion on the importance of correlating somatic functions with changes in the symptoms of schizophrenia as the illness progresses, Schied⁽¹⁶⁾ mentions interesting cyclic somatic changes in three cases. He believes, as a result of studying these, that schizophrenia may include more than one clinical entity. The disorder in each case was characterized by the appearance of acute psychotic episodes (catatonia, vivid hallucinosis and restlessness) on a background of simple hebephrenic lassitude. These episodes were accompanied by an abnormally elevated body temperature, tachycardia and an increase in the red blood cell sedimentation rate. Moderate leucocytosis, with a preponderance of neutrophile cells, occurred during each febrile

period. There was an excessive destruction of red cells and hæmoglobin with anæmia in some cases. This was soon followed by the production of a large number of small immature erythrocytes, which gave rise to a slight polycythæmia, an increase in the number of reticulocytes and a decrease in the colour index of the blood. Before these cases are accepted as representing some new form of psychosis, it might be wise to be sure that the symptoms were not an expression of some intercurrent physical affection of a toxic nature.

That the actual blood volume itself may change considerably in certain mental disorders has been shown by Finkelman,⁽¹⁷⁾ who used the dye method in an investigation of 39 schizophrenics and determined that they had an average circulating blood volume of 2,609 cubic centimetres per square metre of body surface, as compared with 2,973 cubic centimetres in 15 patients with manic-depressive psychosis. The plasma volume per square metre of body surface of the former was 1,433 cubic centimetres, as compared with 1,727 cubic centimetres in the latter. It is concluded that the diminution in the circulating blood volume is related to disturbances in water metabolism, capillary permeability and vasomotor tonus, secretion of the antidiuretic and vaso-pressor hormone of the posterior pituitary gland, and that, therefore, the physical variations in schizophrenia, of which diminution of the circulating blood volume is an example, may be due to dysfunction of the hypothalamus. This conclusion is presented without comment.

These findings have been confirmed to some extent by Freeman and Looney,⁽¹⁸⁾ who found that the total volume of blood was 79.3 cubic centimetres per kilogram of body weight in schizophrenics and 81.4 cubic centimetres in normal subjects. The blood volume per square metre of body surface was 2,824 cubic centimetres in the patients and 3,007 cubic centimetres in the controls. The plasma volume also was significantly higher in normal subjects (1,610 cubic centimetres) than in the patients (1,509 cubic centimetres). Freeman and Looney considered that this decrease was related to the lowered basal rate of oxygen consumption in patients with schizophrenia.

Freeman⁽¹⁹⁾ in a later paper gave the results of a comparison between the circulation times in normal persons and those in schizophrenic patients. He used the sodium cyanide method and determined the "arm to carotid" circulation time in 29 normal men and 32 schizophrenics under basal conditions. The mean circulation time of the latter was definitely longer than that of the former. He found that on the average schizophrenic patients have an abnormally slow and a highly variable rate of blood flow.

Similar results to those of other observers have been reported by Wittkower,⁽²⁰⁾ who noted a change in the size of the heart with the emotional state. By the study of Röntgen pictures distinct fluctuations in the size of the heart, both enlargement and diminution, can be demonstrated. The changes sometimes amount to more than one centimetre.

With subsidence of the emotion the cardiac changes recede. An increase, rarely a decrease, of the leucocyte count generally takes place under emotional influence without change in the differential blood picture. Changes in the calcium, potassium and chloride content of the serum were observed, as well as a change in the water content of the blood.

It is interesting to note that Misch⁽²¹⁾ considered that the choline preparations had proved of considerable value in the relief of the cardio-vascular symptoms of anxiety states. Such conditions as intense vaso-constriction of the skin with paresthesia, sensation of cold and pallor, an increase in the heart rate up to 150 per minute, and arterial hypertension up to 150 millimetres of mercury, which represented a stormy excitation of the sympathetic system, could be removed by an intramuscular injection of 0.1 cubic centimetre of acetylcholine. Even chronic anxiety attacks may disappear after a few days of oral administration of "Pacyl" or "Hypotan". It is believed that the choline preparations exert their effect through stimulation of the parasympathetic system, producing an effect exactly opposite to the anxiety syndrome.

Renal Manifestations.

Renal manifestations are found mainly in quantitative changes in the urine. Polyuria is met with fairly frequently, particularly in the anxiety states and in hysteria, to a less extent in neurasthenia. Frequency of micturition is also common in these conditions. The urine is usually pale and of low specific gravity. There are no changes in the constituents.

Sleeper⁽²²⁾ has made a study of polyuria in relation to schizophrenia, and has determined that prolonged polydipsia, with the excretion of as much as seven litres a day, had no deleterious effects on these patients. Examination of the urine of those with polyuria revealed a higher total solid content and a lower specific gravity; these patients had a higher mean systolic and diastolic blood pressure, and, most interesting feature of all, a higher intelligence quotient and less emotional deterioration. The same author in another communication⁽²³⁾ on this subject reported that the average quantity of urine excreted by schizophrenics was 2,532 cubic centimetres, as compared with the normal 1,328 cubic centimetres—that is, nearly twice as much. Renal function tests gave normal results, and Sleeper concluded that the condition was due to changes, either functional or organic, in the diencephalon.

Anuria has been found in hysteria. It is usually of brief duration and responds readily to hot baths and the administration of diuretics. The mechanism is somewhat obscure, but probably corresponds to the paresis of a limb and is a similar form of loss of function.

Glycosuria has been reported in states of emotional tension, such as hysteria and anxiety neurosis. Glucose tolerance tests have given normal results and this glycosuria does not appear to be

the ordinary type of "renal leak", although closely akin to it. Whether some disturbance of sympathetic tonus results in undue permeability of the renal endothelium or whether some other explanation can be given remains a problem which has not reached solution.

Ischuria occurs relatively infrequently. It has been found in hysteria and occasionally in depressive states. It does not necessarily show a relationship to the amount of fluid intake.

Retention and incontinence of urine, apart from organic lesions, are often found in depressive states, schizophrenia and the various types of dementia. The former is sometimes present in hysteria, and is best ignored; the discomfort suffered will eventually produce its own cure. The latter, contrary to common belief, is not infrequent in hysteria, and may even occur in hystero-epilepsy, particularly if the patient is aware of its significance in the idiopathic form. In the same condition it may represent an infantile regression and it is then a part of the general psychological immaturity so frequently met with. Then again, it may serve to lend emphasis to the patient's disapproval of her lot and the difficulties with which she is confronted.

Discussion.

The above are the main forms of renal expression of a psychoneurotic conflict. The functional basis is obvious in most instances and should not present any diagnostic pitfall. The mental states which arise as the direct result of disease of the circulatory and renal systems are comparatively well known, and therefore some attention has been given to the influence of the psychoses and the neuroses on the proper functioning of these systems. Particular reference has been made to the work of certain investigators who have explored new avenues and indicated lines of research along which we could well proceed with advantage, in the hope that some new light might be shed on conditions the pathology of which still remains obscure.

Conclusions.

1. There is no psychiatric condition which is typically associated with cardio-vascular or renal disease.
2. The commonest mental manifestations of systemic disease are states of delirium, confusion and dementia.
3. Mania, depression and paranoid delusions are all found at different times in different cases.
4. The neuroses may produce disturbance of the cardiac rhythm; but changes in the blood more commonly occur in the psychoses, particularly in schizophrenia.
5. The renal manifestations of mental disorder take the form of quantitative changes in the urine and are found mainly in the neuroses.
6. There is scope for considerable research in the blood chemistry in mental conditions, as our knowledge of the aetiology of many of these is still very limited.

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Reports of Cases.

ABNORMAL ATTACHMENT OF FETUS TO PLACENTA: A REPORT OF TWO CASES.¹

By ISADORE BRODSKY,
Sydney.

Two rare examples of abnormal fetal attachment to the placenta appear to be worthy of record.

The fetuses, a female and a male, were forwarded to the department of obstetrics and to the department of pathology, University of Sydney, where the following details of morphology were made out.

The facts relating to each specimen are as follows.

Specimen I.

Clinical Notes.

The mother, aged twenty-three years, who had previously given birth to a full-time normal child, attended at the

¹ This investigation was carried out at the department of pathology, University of Sydney, in 1938, with the aid of a grant from the National Health and Medical Research Council.

out-patient department of Saint Margaret's Hospital, Darlinghurst, for antenatal care. The diagnosis of the presentation was right occipito-anterior or left occipito-anterior until May 16, 1938, when "the hardest mass was felt in the fundus . . . head could not be felt for certain". The diagnosis was then changed to that of a breech presentation. In other respects this and the previous pregnancy were considered normal. The mother was admitted to hospital on May 23, 1938 at 2.45 a.m. Uterine contractions had commenced at 11 p.m. on the previous evening, and she was found to be in strong labour, with the membranes bulging in the form of a sausage. The membranes ruptured, an elbow prolapsed, and the liquor *emati*, which was considered to be slightly excessive, was stained with bright blood. On the arrival of the honorary medical officer the following details were noted: the fetus was lying obliquely and the head was very difficult to palpate in the right iliac fossa; the fetus was fixed in that position; the mother was having hemorrhage with each contraction and losing much blood; fetal heart sounds were heard between contractions, but not during them.

Interference was decided upon on account of the hemorrhage. An attempt was made to convert the presentation to a breech; but this was difficult, because the head could not be moved up. The scalp appeared to be represented by placenta, and each time that the head was pushed toward the fundus or an attempt was made to pull down a limb, a fresh hemorrhage occurred. Under fairly forcible movement the child was delivered rapidly by the legs, the head following with the placenta attached to it. The delivery was effected at 7.45 a.m., five hours after the patient's admission to hospital.

The infant, a female, lived almost forty hours. The passage of meconium was noted. The fetal age was recorded as eight and a half months. There was no previous history of malformation in the families of either parent.

Post Mortem Examination.

The infant weighed 2,397 grammes (six pounds six ounces) and measured 49.5 centimetres (nineteen and a half inches); the sex was female and the colour white. No internal examination was made.

Except for a fusion of the fourth and little toes of the right foot and an enlargement of the second toe of the left foot, there is no abnormality below the level of the neck (Figure I).



FIGURE I.
The anterior surface.

The umbilical cord, approximately 34 centimetres long, is intact, and passes cranially to be inserted into the placenta, which is attached by a broad cylindrical pedicle to the antero-superior aspect of the head. The head lies tilted to the left. The cylindrical pedicle is approximately 19 centimetres in circumference at its base and is seven centimetres long. On its ventral surface there is a small opening, probably traumatic in origin, through which tissue resembling brain can be seen. The walls of the pedicle are continuous with the fetal surface of the placenta.

The face is grossly abnormal. The nose is absent, the skin above the upper lip merging onto the pedicle, which lacks skin epithelium, except to the right of the area usually occupied by the nose and over the right parieto-occipital region. Above and to the left of the upper lip

is a sinus which suggests a nostril. A probe can be made to travel in it in an obliquely upward direction, where a communication with a sinus on the left side of the pedicle, at its base, is established. This upper sinus overlies a deep horizontal fissure, in the depths of which a palpebral fissure but no eye can be seen. At a higher level on the right side is a palpebral fissure, the upper margin of which is notched. When the lids are retracted an eye is noted. The mouth is gaping, but the lower lip is well formed. The lower lip is 4.7 centimetres long and is 2.7 centimetres longer than its fellow. Both the palate and tongue are normal, while there is no apparent abnormality of the ears in position, size or shape.

Radiographic Examination.

The radiographs demonstrated the gross abnormality of the skull; the detail was considered insufficiently clear to call for an itemized report. The placenta appeared to be dense, but this was considered to be due to exposure to the air and to fixatives.

Specimen II.

Clinical Notes.

The mother was a *multipara*, having three children. The labour was precipitate and presented no difficulty. The infant was born prematurely at the seventh month, the heart beating for one hour after birth. No other clinical details are known.

Post Mortem Examination.

The infant was a small white male. From the anterior aspect the upper half of the body appears normal, in general terms, and below the level of the subcostal margin the anterior abdominal wall is replaced by a glistening opaque membrane, which is continuous with the fetal surface of the amnion. The inferior extremities have been displaced, and their position can be seen from an inspection posteriorly. The two illustrations (Figures II and III) save unnecessary description.

The face is somewhat asymmetrical, but this may be due to faulty fixation. The superior extremities and the thorax

subcostal angle. The pericardial sac is directly attached to the posterior surface of the epigastrium, the sternal slips of the diaphragm being absent. On section the chambers of the heart are normal.



FIGURE III.
Posterior surface.

The lungs exhibit only one abnormality, the right lung possessing the cardiac notch. Below the level of the heart the skin of the anterior abdominal wall is replaced



FIGURE II.
Anterior surface.

are normal. An incision into the anterior thoracic wall reveals a globular shaped heart lying in the mid-line, the commencement of the aorta coinciding with the apex of the

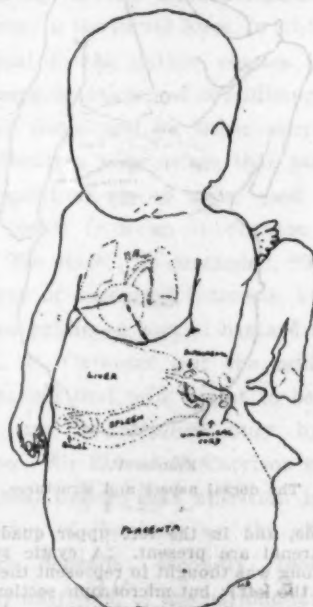


FIGURE IV.
Showing the ventral structures.

by a translucent membrane. Through it liver and coils of bowel are evident. The relation of these structures to each other is shown in the diagram (Figure IV).

On dissection the round ligament of the liver emerges on the left lateral side and enters the extremely short umbilical cord (six centimetres in length) under cover of the membrane. Inferior to the liver is the spleen, which is ventral to small bowel and to the ileo-caecal junction. The appendix lies next to the greater curvature of the stomach. After the round ligament is cut and the liver displaced upward the stomach is found to be in its normal position, with the pancreas lying on the dorsal surface of the greater curvature and directed toward the spleen. Small bowel is lying dorsal to the liver, the large bowel being situated on the left side of the abdomen. The latter contains some material which cannot be expressed distally. The upper margin of the placenta supports the viscera in a shallow ditch.

To the left of the stomach lies an ovoid mass, perpendicular and subjacent to the round ligament, which courses horizontally to the *porta hepatis*. At the lower pole of the ovoid mass is a flattened testis, and the mass contains a suprarenal and a kidney, the suprarenal being applied to the right supero-lateral margin of the kidney. The ureter of this kidney runs from the left dorso-lateral margin and reaches the bladder after a course of two centimetres, the ureter being crossed ventrally by the *ductus deferens*. Below the lower pole of the kidney is the rectum.

When the peritoneum is reflected downward over the placenta, the following disposition of viscera is noted posteriorly (Figure V). Liver and small bowel occupy



FIGURE V.
The dorsal aspect and structures.

the right side, and in the left upper quadrant a testis and a suprarenal are present. A cystic swelling three centimetres long was thought to represent the other kidney (presumably the left); but microscopic sections disclose no recognisable gross anatomical structure. At the medial margin of the cyst there is a deep circular fissure which is continuous with the cavity of the spinal column.

The right inferior extremity lies with the leg flexed on the thigh. The skin of the upper two-thirds of the leg is fused with that of the thigh. Near the upper and inner region of the thigh a small oval mass has the characters

of scrotal tissue. The extremity is attached to the back by a folded skin and does not articulate with the pelvic bone.

A similar fusion of skin unites the left leg to the thigh. The foot shows rudimentary toes on a compressed foot. At the inferior end of the left ramus of the pubis are a penis and scrotum. Dorsal to this a fissure corresponds with the site, but not the appearance, of an anus. No communication with the rectum exists.

Acknowledgements.

Thanks are recorded to the department of obstetrics and the department of pathology, University of Sydney, for the provision of the material; to Dr. Foy and Dr. Martin, who donated the specimens to the departments concerned; to Dr. O'Reilly (Saint Margaret's Hospital), who assisted with the case notes; and to Mr. Jamieson for the radiograph. The photography of Mr. Woodward Smith clearly shows that which may have appeared vague in the text.

Reviews.

HEADACHE AND HEAD PAINS.

In "Headache and Head Pains"¹ Dr. Walton Forest Dutton points out in the preface that "a headache is a headache in any language . . . The American Medical Association for many years has conducted a campaign against nostrums and quackery and pseudomedicine through the medium of the Council on Pharmacy and Chemistry and its publications. The lay press, unscrupulous manufacturers and radio advertising of nostrums and cure-alls to the public present a serious problem . . . a headache cannot continue over any great period of augmentation without a background of disease . . ." The book is a valuable reference manual of 301 pages, with an introduction of 32 pages, which deals with the physiology of the nervous system and the etiology of headache, analysis of causal factors and discussion, also six pages on the relief of pain. The introduction reflects credit on the author.

There are 244 pages entitled "Affections Causing Headache and Head Pains", arranged alphabetically. Each affection is briefly described, with recognized treatment. As "search for and remove the cause" is the basic motto underlying modern medical treatment, it is interesting to note that when a patient asks for "something to relieve a headache" the physician must first decide which of the 229 affections mentioned in the book is the cause of the headache. This fact should interest the public who seek over-the-counter advice from pharmacists and from untrained lay practitioners.

The first affection is acromegaly, the last, yellow fever. In between—a random selection—come Addison's disease, allergic headache, arterial hypertension (and hypotension), brain tumour, cerebral rheumatism, constipation (excellently dealt with), eclampsia, measles, meat poisoning, muscular tension headache, nephritis, sinusitis, syphilis, *tic douloureux*, quinsy, uræmia, Well's disease and yaws.

The author has laboriously compiled data and has made his summary and treatment of each disease enjoyably readable. This feat is so rare that Dr. Dutton's book comes into a medical "summary-catalogue" library like a breath of fresh air into the morgue. There is a 37-page therapeutic index and a 7-page index of remedies (drug).

The book is well set up, clearly printed and efficiently indexed. The author has a good literary style and, unlike some American productions, the book can be read without offence by the sensitive purist in English.

¹ "Headache and Head Pains: A Ready Reference Manual for Physicians", by W. F. Dutton, M.D.; 1939. Philadelphia: F. A. Davis. Medium 8vo, pp 323. Price: \$4.50 net.

The Medical Journal of Australia

SATURDAY, DECEMBER 30, 1939.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: Initials of author, surname of author, full title of article, name of journal, volume, full date (month, day and year), number of the first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

NUTRITION AND THE PUBLIC HEALTH.

For a medical association to divert attention away from a preoccupation with established disease to a consideration of the factors which bring it about is a hopeful augury of constructive progress. Such an excursion into the fields of agriculture, industry and education, as well as medicine, took place in April of this year under the auspices of the British Medical Association in London. The proceedings of this "National Conference on the Wider Aspects of Nutrition" have been published in a small book under the title of "Nutrition and the Public Health".¹

The delegates included more able and distinguished experts than had ever previously been gathered together to discuss this subject, and they declared themselves unanimously as being "deeply impressed with the importance of nutrition to the national welfare". They advocated by resolution an educational campaign to increase consumption of those foods which are desirable on nutritional

grounds, and plans were made to increase their availability. Seven government departments supported the conference, also six overseas governments, eighty scientific and public organizations and some thirty industrial and commercial undertakings. Four hundred delegates were accredited. Their conclusions collected in this book will serve as a text book for future coordinated endeavour.

Sir Kaye Le Fleming, the Chairman of the Council of the British Medical Association, introduced the Chairman of the medical session, Lord Horder, who stated that food was the major factor which went to make up healthy people. He pointed out, however, that a drastic change in the present economic position was essential to make the necessary food available through production and distribution. In referring to the problems of food in relation to national defence, Sir John Salter made the point that the rations are more important than the rationing. Regarding milk, he disclosed a weakness inherent also in many food marketing boards in Australia, that milk is treated primarily as an important part of the incomes of farmers and only secondarily as the most essential of foods. Milk, moreover, in the liquid form, in which it is the most beneficial to the nation, carries the highest price, and bears the burden of subsidizing the use of milk in other forms and for other purposes. The Gilbertian situation then arises that public funds have to be spent to try to make good the social effects that result from an inadequate milk consumption. "The state", he concluded, "is becoming the instrument of organized interests, and not the servant of the public—a sort of bastard socialism." Professor E. P. Cathcart put the milk position tersely by stating that milk ought to be safe, and that safety can be attained only by efficient pasteurization. Sir Robert McCarrison made three valuable points: firstly, that nutrition is a fundamental function of the body on the efficiency of which health depends; secondly, food, as an instrument of nutrition, is the paramount influence in determining man's general physical endowment, powers of endurance, and resistance to disease; and, thirdly, that a well-constituted diet, made up of fresh natural foodstuffs, contains all things needful

¹ "Nutrition and the Public Health. Medicine, Agriculture, Industry, Education: Proceedings of a National Conference on the Wider Aspects of Nutrition, April 27, 28, 29, 1939"; 1939. London: The British Medical Association. Medium 8vo, pp. 150. Price: 2s. 6d. net.

for normal nutrition. In these three principles lie means for the prevention and alleviation of a vast amount of human suffering.

In the session on agriculture, under the chairmanship of Sir John Russell, Viscount Astor expressed his conviction that the public did not realize either the importance of nutrition or the damage caused by malnutrition. The same was true, he added, even of the medical profession. Taking up the phrase of Mr. S. M. Bruce, he concluded by stating that the policy of marrying the interests of agriculture and nutrition would bring health and welfare to millions of people; a balanced nutrition, however, required a balanced agriculture.

Viscount Bledisloe, who presided over a session which considered overseas production, drew attention to a state of affairs in which the farmer knows more about feeding his livestock than the average parent knows about feeding children. He recognized that the summer conditions of the Dominions endowed their product with a vitalizing value which conduces to human health and a greater immunity to disease. F. L. McDougall, representing the Australian Government, reported the serious under-consumption of milk in Australia that was revealed by the Advisory Council on Nutrition in its survey which, he considered, was more elaborate than has been undertaken in any other Dominion. Professor H. W. Wadham (University of Melbourne) outlined the problem of soil erosion as it existed in Australia, but he did not consider that a serious loss of capacity to export would result from this cause.

In the session dealing with means of stimulating consumption, L. S. Amery considered that the main cause of malnutrition was a wage system that took no account of family needs, and suggested a system of family allowances. This would tend to overcome the present economic frustration of parenthood.

In the final session concerned with education as a means of stimulating consumption, the Chairman, Sir Cyril Norwood (who will be remembered in Australia as one of the leaders of the New Education Conference) considered the means of training a generation to know what good nutrition was, and to determine to have it. He aptly used the simile

of the horse and the water. Reference was made in this session to the danger of issuing to the school child or the public awe-inspiring tables of chemical composition and calories. As the Duke of Wellington said in similar circumstances: "My God, they frighten me." Simplicity, interest and attractiveness are the key notes of the educational approach at all ages. The value of Nutrition Supplements in newspapers was pointed out. In the Sir Charles Hastings lecture, Professor Mottram referred to the frustrating effect of vested interests on the spread of nutritional knowledge. This frustrating effect has been in evidence in Australia.

"Nutrition and Public Health" is a masterly summary of able opinion on the many ramifications of a subject which, while difficult, offers immense constructive possibilities of freeing humanity from many of the illnesses to which the flesh used to be thought heir. It is only possible in this brief survey to indicate the scope of the subject with some of its highlights. The more careful study of this book by members in Australia would assist the realization that in this country also there is an urgent need for cooperative effort in the formulation of a long term food policy in which the requirements of health, agriculture and industry shall be considered in mutual relation.

Current Comment.

THE DIAGNOSIS OF GRAVES'S DISEASE.

POPULAR writers sometimes envisage an imaginary scene in the medical clinic of the future when patients will be drafted into groups submitted to appropriate series of chemical and physical tests, emerging at the conclusion of these with the appropriate diagnostic label. Even medical authorities sometimes adumbrate such a mechanized diagnostic clinic, so that it comes as a relief to obtain evidence of the value of plain objective observations made by skilled clinicians. An excellent example of this is found in that group of conditions whose essential feature is an excessive activity of the thyroid mechanism. Attention has been recently called in this journal to the importance of the recognition of the various masked manifestations of hyperthyroidism, particularly with reference to the curiously divergent clinical pictures which it may present.

F. H. King and A. R. Sohval have also recently published a study of the relative value of several laboratory tests in the diagnosis of Graves's disease and allied conditions.¹ They point out that typical cases of this syndrome present no difficulty whatever, but that in other instances the true diagnosis may be obscure, particularly in cases of inactive Graves's disease, autonomic imbalance, menopausal disturbance, simple goitre and essential hypertension. Eighty-seven patients were studied over a two-year period; of these, only eleven had active and six inactive hyperthyroidism. Fifty-six patients were classed as borderline, the majority showing what King and Sohval classify as autonomic imbalance, in which the outstanding symptoms and signs were palpitation, dyspnoea, tachycardia, tremor, sweating, vasomotor and emotional disturbances, nervousness which included anxiety states, episodes of digestive disturbances, menstrual derangements, headache and insomnia. The remaining patients were suffering from essential hypertension or non-toxic goitre, and though there was little difficulty in establishing a correct diagnosis, they were included in the investigation in order to furnish more information on the value of the laboratory procedures. The tests employed were the estimation of the basal metabolic rate, the calculation of the circulation time and the creatine tolerance test. Of these, the first is that universally employed, though such authorities as Zondek have stated that the minute volume of the heart is observed to show increased values in hyperthyroidism before substantial rises in the basal metabolic rate are found to occur. King and Sohval have found that in the cases simulating Graves's disease initial determinations of the basal metabolic rate are misleading, and that further serial observation of such patients under standard hospital conditions often show that the earlier estimations are found not to be truly basal, and therefore too high. They emphasize that isolated high readings obtained from ambulant patients are liable to lead to error, as are also low readings on the subjects of true hyperthyroidism who have entered on a quiet phase or cycle of the disease. The estimation of the circulation time was apparently chosen as a test of velocity of blood flow on account of its simplicity. The arm to tongue time after injection of saccharine was used in this series. Roughly speaking, it was found to run parallel to the basal metabolic rate, but it had no particular value otherwise, for though the generalization that a raised metabolic rate meant an increase in blood velocity was true, the observed differences were not sharp enough to help in individual diagnosis. The creatine tolerance test is based on the recent observation that spontaneous creatinuria occurs in Graves's disease, but disappears on the administration of iodine. The patient is placed on a creatine-free diet, and then creatine is administered and the degree of creatine excretion or retention estimated. It was not found that this test was really valuable

or reliable. King and Sohval make no reference to the estimation of the electrical impedance of the body; this test roused some interest some time ago, but it seems to have gone the way of others. They conclude that in the last analysis clinical judgement surpasses in value any of the laboratory aids employed in their series.

The estimation of the basal metabolic rate still remains the most reliable of the laboratory data obtainable; but all clinicians of experience will agree that even this test in single instances, or even occasionally in serial determinations, has to be set aside if it appears to be in conflict with the clinical findings. Perhaps the best instance of the value of the latter in hyperthyroidism is seen in the ocular signs. Exophthalmos can be actually estimated in extent; the degree of stare, of upper lid retraction, of the infrequency of winking movements and of exposure of the sclerotics may also be described in more or less accurate terms; but none of these surpasses the conclusions of an experienced observer, who merely looks carefully at the patient and integrates his findings into a definite conclusion. This in no way minimizes the value of laboratory studies; but it must be realized that the worst opponents of the sciences ancillary to medicine are those who fail to align them with all other available information.

THE SUBTHALAMIC NUCLEUS OF LUY'S.

THE subthalamic nucleus lies close to the *zona incerta*, in the region between the mid-brain and diencephalon. It is lenticular in form and it has fibre connexions with the *globus pallidus* and thalamus above, while it gives rise to a descending tract; the blood supply comes through the anterior chorioidal and posterior cerebral arteries.

For long the functions of the subthalamic body have remained uncertain, although a number of workers (Grieff, Canfield and Putnam, Touche, von Economo, Fischer, Lewandowsky and Stadelmann, Bremme, Pette, Campora, Jakob, Martin and others) have described cases in which a violent hemichorea has been associated with the *post mortem* finding of destruction in the *corpus subthalamicum*. Unfortunately, the cerebral lesion is frequently widespread, involving other cerebral structures also and the exact localization was generally in doubt. This violent hemichorea is characterized by its acute onset, usually in persons of advancing years, and has been designated hemiballismus; it may be associated with other cerebral symptoms, depending upon the structures damaged, and occasionally it may become bilateral. The lesion is most often of vascular origin, although cases have been associated with syphilis, metastatic neoplasm, tuberculous foci, abscess or sclerosis. Almost invariably the patient dies within a few weeks or months from bronchopneumonia.

Of the twenty-five or so cases which have been described, in all the subthalamic nucleus or its

¹ *Annals of Internal Medicine*, August, 1939.

descending tract were damaged. In an interesting analysis J. P. Martin¹ points out that hemiballismus may occur in the absence of damage to the cerebral cortex, *corpus striatum*, internal capsule, thalamus, *zona incerta*, red nucleus, *substantia nigra* or cerebellum. Moreover, damage to fibres afferent to the subthalamic nucleus from above does not produce hemichorea. The syndrome is obviously a "release" phenomenon depending upon loss of some control of the motor pathways—hemiballismus does not appear if the pyramidal tracts are destroyed at the same time.

Recently F. P. Moersch and J. W. Kernohan² were afforded the opportunity of examining a case of hemiballismus in which practically the only cerebral finding was infarction in one nucleus of Luys (a small infarction was also found in the pons, but is probably irrelevant in this context). These authors were able to trace degeneration from the subthalamic nucleus in a descending tract which accompanied the medial lemniscus as far as the sensory decussation, and they confirmed Martin's observations in this respect. The isolated nature of the lesion which they found practically decides the role which the *corpus subthalamicum* plays in the production of hemiballismus. In one respect, however, their report differs from all the others: wherever the site of the lesion is recorded the symptoms have been contralateral; in the case described by Moersch and Kernohan the symptoms were ipsilateral. Here there may be some error in reporting; at least the discrepancy warrants reinvestigation.

Special Articles on Civilian War Casualties.

XIII.

ABDOMINAL WOUNDS.³

I SHOULD find it rather easier to speak on the subject of wounds of the abdomen in general than on those due specifically to air raids, for the reason that in the Great War wounds of any sort caused by raiding aircraft came under my care with comparative infrequency. I can remember clearly only a certain small number of such cases, and those mainly, I think, because they occurred amongst unfortunate French civilians. These wounds constituted a very small proportion of the whole, and in general the injuries were of a type familiar to us in the guise of industrial and motor transport casualties.

It seems, however, that the wounds caused by aerial bombs may approximate in nature to those of ordinary warfare, inasmuch as high explosives of every type must be metal-contained, and that in addition abdominal injuries may well be caused by flying fragments of masonry, paving or timber, or the intense concussion of bomb explosion. But my personal experience has been that gained in dealing with wounds caused particularly by bullet and shell, trench mortar and hand grenade—the everyday instruments of warfare in the past.

¹ *Brain*, Volume L, 1927, page 637.

² *Archives of Neurology and Psychiatry*, Volume XLI, 1939, page 365.

³ A lecture delivered under the auspices of the Melbourne Permanent Post-Graduate Committee on August 9, 1939.

Incidence of Abdominal Wounds.

The diagnosis of perforating abdominal wound was made, according to the statistics compiled by a certain group of field ambulances, in 1.92% of all casualties passing through. In the corresponding casualty clearing stations, with greater opportunities for accurate diagnosis, the figure for the same period was 0.72%. The discrepancy is largely due to the great number of severely wounded who die in forward units. These figures can only be taken as approximate, for other authorities put the incidence at 2% to 3%; but they will convey the fact that the number of patients with abdominal wounds who reach the operating theatre is relatively small.

The Wound of Entrance.

It may be remarked at the outset that there may be no wound of entrance, the injury being of closed or non-penetrating type. Such injuries, whether due to concussive causes, such as collapse of buildings or dugouts *et cetera*, will not repay discussion, for they will differ little from the casualties of normal conditions. They will present themselves as we are accustomed to meet them, affording the same problems in diagnosis and being subject to the same methods of treatment. The penetrating abdominal wound is seen in varied guise, from extensive destruction of the abdominal wall, with visceral prolapse on the one hand, to a tiny inconspicuous puncture, perhaps in some apparently unrelated site, on the other. It must be ever borne in mind that the point of entrance of a penetrating abdominal wound may be far removed from that region, and may be found only after a search of the back, thorax, thigh, buttock or perineum.

It is of interest, in this connexion, to view the regional incidence of wounds of entrance, as charted at casualty clearing stations. The considerable number of buttock wounds is apparent, as are the great number of lateral wounds associated with trench warfare (Figure I).

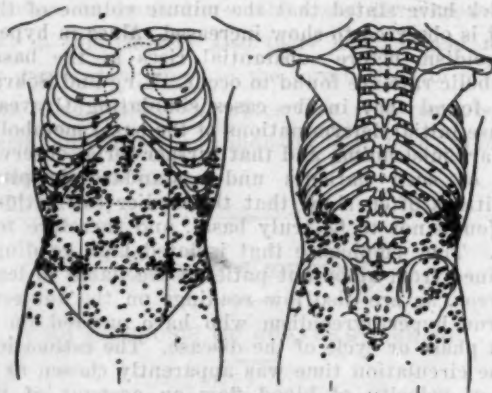


FIGURE I.

On the right side of the page is shown the regional incidence of wounds. Front view: 439 wounds; mortality 53%. On the left is shown regional incidence of wounds. Back view: 223 wounds; mortality 60%. (Reproduced from paper by Cuthbert Wallace in *The British Journal of Surgery*, Volume IV, 1916-1917, page 619.)

Given a wound and a suspicion that the abdomen may be involved, the first question is as to the reality of the penetration. The problem is considerably simplified if a definite wound of exit also exists. Two possible sources of fallacy occur in this connexion. In the first place, the apparent wound of exit may represent a second wound of entrance, bearing only a casual relationship with the other. Again, even when the nature of the two wounds is quite unequivocal and a line joining them suggests abdominal involvement, it may not be easy to be sure of this. The thickness of the abdominal wall is hard to judge, and this is particularly the case in the flank region. Frequently the relationship of undoubted wounds of entrance and exit will leave little doubt as to the fact of

penetration and the course taken by the projectile. A knowledge of this course is so important that, in the absence of an exit wound, every attempt should be made to decide it in some other way. Sometimes palpation at a point where pain or tenderness is complained of may solve the problem, at other times a consideration of signs or symptoms may help; but in very many instances the X ray localization of the retained missile is indispensable.

The course taken by the missile after entrance is of great importance in other ways than as simply affecting the probability of peritoneal involvement. A knowledge of this course may determine a decision to refrain from operation, as when, for instance, it is evident that a solid viscus (usually the liver) is alone involved. This same knowledge, on the other hand, may suggest both the inevitability of a peritoneal lesion and the particular viscera likely to be affected. And finally, an intimation of the likely visceral damage may later determine the type of incision chosen for access.

The Diagnosis of Intraperitoneal Damage.

A consideration of the exact position of the wound or wounds will always play a very large part in determining a diagnosis, although in general it may be said that the signs and symptoms combine to form a definite picture, made up of pain, tenderness, rigidity and vomiting, accompanied by varying degrees of pallor and collapse, with or without the physical signs of intraperitoneal hæmorrhage.

A man hit in the abdomen usually looks ill, at any rate by the time he has been transported two or three miles. He is suffering from shock and cold to a degree which is largely dependent upon the severity of the bleeding or the extent of extravasation into his abdomen.

The appearance may be of great value in distinguishing the innocent parietal lesion from the penetrating wound. As a rule, the victim of the latter usually looks the part, even although his pulse may not be very rapid and there is little sign of loss of blood. The pulse is small and the aspect one of cold, even although restorative warmth has been applied.

The pulse rate, in the earlier stages, is determined by the extent of hæmorrhage, and is an important index as to both operability and likelihood of recovery.

No single guide is of greater value, in any case of doubt, than observation and continued observation of the pulse, its rate, volume and pressure, and variations therein following a period of warmth and restoration. The information conveyed in this way may indicate that intervention is not called for, that operation is or has become a justifiable procedure, or that no alternative exists to mere alleviation of the pain that is present in every case to a greater or less degree.

The significance of a rising pulse rate is usually that of a continuing hæmorrhage or the onset of peritonitis. The physical signs of blood extravasated in the peritoneal cavity notoriously lag far behind the indications of a rising pulse rate and an increasing anæmia.

The pulse rate carries a considerable prognostic significance also (Table I).

From this table it can be seen that in a large number of cases the pulse rate is in the neighbourhood of 100 per minute, and that the prognosis in such cases is a fair one; but that when the pulse rate has risen to 120 or over, the expectation of recovery is only about 16%.

These figures apply to a period prior to 1917, during which year the value of blood transfusion for the severely

wounded became more generally recognized. With its wider use results improved. Gordon-Taylor was able to report a personal series of patients with abdominal injuries whose pulse rate was over 120 per minute; of these, after blood transfusion and operation, 41% recovered, as against a percentage of 16 prior to the introduction of blood transfusion. In another series, in which the pulse rate was 140 per minute and over, the recovery rate was 37.7% under Gordon-Taylor's skilful hands; this was in contrast with the former percentage of 9. The same improvement was seen in the results of abdomino-thoracic wounds, in which the recovery rate, after the general employment of blood transfusion, rose from 49% to 66.6%, the latter in a series of 207 cases in the Fourth Army in 1918.

Rigidity is a sign which is almost invariably present, but which is not very helpful. It is unhelpful because it may be very evident in injuries which are merely parietal, or in thoracic wounds in which the abdominal cavity is not involved.

It is found with lesions of both hollow and solid viscera; it appears to be a local protective reflex after receipt of any injury or to be due to the irritation caused by the presence of either blood or infection.

Complete absence of rigidity in the face of an obvious abdominal lesion is a sign of the worst possible significance. Board-like rigidity with extreme pain connotes almost with certainty an intestinal perforation. In general, however, pain is an extremely variable feature of penetrating wounds. "Briefly, we place most reliance on the facies, the pulse and the position and character of the wound or wounds, and rely secondarily on rigidity of the abdominal wall" (Webb and Milligan).

Errors and Difficulties in Diagnosis.

Errors and difficulties in diagnosis may result either in the fruitless opening of an unpenetrated abdomen, on the one hand, or delay in or complete failure to carry out a necessary operation, on the other. Little harm will result from the former, save that other casualties, in times of stress, may be deprived of a just priority.

A more serious error is the substitution of a laparotomy, undertaken for what is apparently a penetrating wound, for an operation which should have been directed towards a gas-gangrene infection of the abdominal or loin muscles. The toxæmic vomiting and collapse in such a case may be prominent and misleading, the infection having followed the inclusion of portions of clothing in the wound or a retroperitoneal wound of the large intestine.

The local or general rigidity which may accompany a purely parietal wound may be a source of confusion and error. The condition of the patient in such a case (apart from other possible injuries) is obviously good; other signs of peritonism or those of hæmorrhage are absent, and the rigidity disappears or is minimized upon such flexion of the trunk and hips as will relax the tension of the abdominal muscles.

The difficulty in diagnosis that may surround low thoracic injuries is well known to all. It is to be remembered that a number of penetrating abdominal wounds enter from above the diaphragm, being incurred either when the recipient is in the prone position or when the direction of fire has been from above, as in machine-gunning from a low-flying aeroplane. Perhaps the greatest possibilities of error arise in association with buttock wounds and very small wounds in the back, which appear to be easily overlooked, particularly when multiple wounds are present.

TABLE I.
Showing how the Pulse-rate affects Prognosis. 577 Cases. (After Wallace.)

Pulse rate up to and including	60	70	80	90	100	110	120	130	140 and over.
To base	1	7	23	30	108	27	37	7	9
Died	1	2	13	15	39	38	88	37	92
	2	9	36	48	147	65	125	44	101

When from a consideration of all the features of a case it seems that the possibility of an intraperitoneal lesion exists, exploration should be carried out even when the wound is definitely a parietal one. On occasions intense commotion about the path of a high velocity projectile may bring about rupture of a subjacent solid or hollow viscus without actual penetration of the peritoneum.

Experience shows that in cases of doubt the path of wisdom leads to the operating table, particularly when it is remembered that abdominal injury from causes other than the projectile may be present. The injury may be due to the falling in of buildings or materials thrown about by the explosion.

A further reference to the sites of entrance wounds shows that mid-line wounds, front or back, are few. Such casualties are likely to die rapidly from injury to the great vessels. The next chart (Figure II) is not without interest. It indicates the regional incidence among

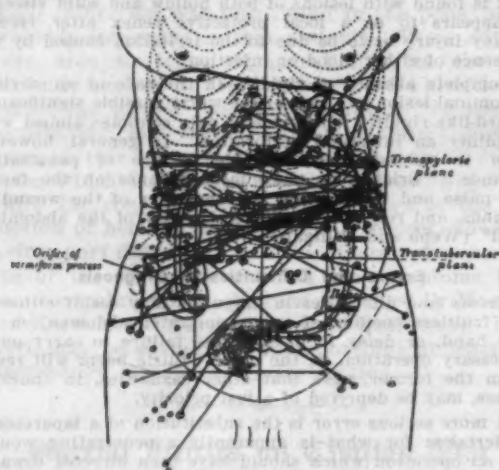


FIGURE II.

Chart of patients too seriously wounded to be submitted to operation, all cases being fatal. A block dot represents an anterior wound, a circle a posterior wound; the track of the projectile is shown by a line. (Reproduced from paper by Cuthbert Wallace in *The British Journal of Surgery*, Volume IV, 1916-1917, page 679.)

patients arriving at casualty clearing stations in such a condition that operation was out of the question, and who all died. From this chart the curious fatality attending wounds of the left side of the hypochondrium is apparent. This is the region beset with difficulties. There is an absence of mid-line and hypogastric casualties—of the former because they have perished earlier, of the latter because the majority are "operable risks". The large number of lateral traversing wounds is to be noted. These always carry a grave prognosis.

Treatment.

Experience shows that, when the general condition permits, operation is wisest as a rule. A chart of patients recovering without operation (Figure III) shows that a large proportion of these wounds involved the liver. Wounds of the liver and of other solid viscera are less liable to be fatal if the patient is not operated upon than when the hollow viscera are involved; but in the former cases certain infective risks associated with the retention of a foreign body may still have to be faced.

Apart from operation, the chances of recovery after perforation of a hollow viscus are very small, and belief in this possibility was abandoned quite early in the War. The chart (Figure IV) shows the sites of wounds which at laparotomy were found to have involved no hollow viscus. The abdomen in such cases is usually full of blood which has come from injury to the vessels of the omenta or mesenteries or of the deep epigastric vessels.

There are certain types of patient who constitute exceptions or possible exceptions to the general plan of treatment by operation: (a) patients who are too gravely ill, despite all efforts at resuscitation (the assessment of the operative risk will always be a matter of personal surgical judgement); (b) patients wounded high up in the abdomen in the liver region, provided that (1) there is

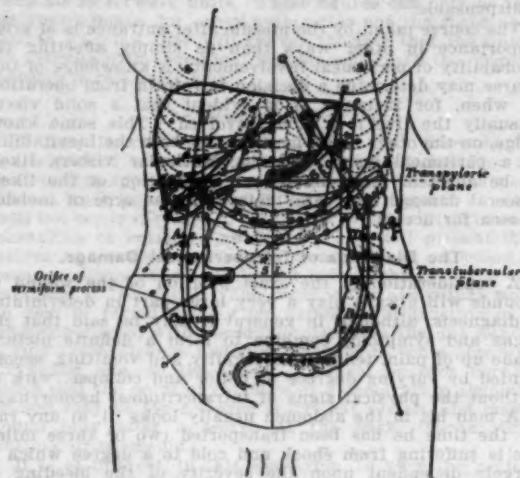


FIGURE III.

Chart of patients who recovered without operation. Dots, circles and lines have same significance as in Figure II. (Reproduced from paper by Cuthbert Wallace in *The British Journal of Surgery*, Volume IV, 1916-1917, page 679.)

no sign of ingravescant hæmorrhage, (2) there is no large retained foreign body; (c) patients with high abdomino-thoracic wounds of the left side, whose abdominal lesion, if it exists, is of the œsophagus or adjacent cardia,

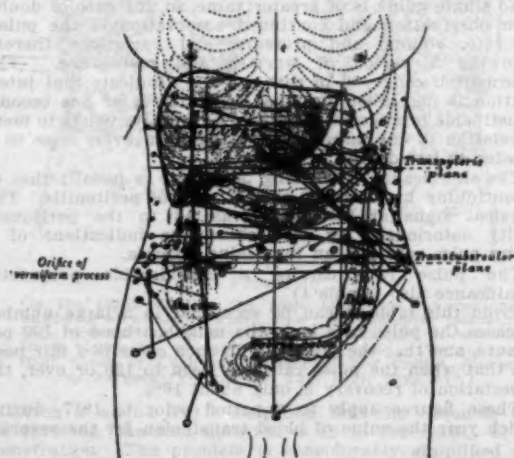


FIGURE IV.

Chart of cases in which celiotomy was performed and no hollow viscus was found injured. Dots, circles and lines have the same significance as in Figure II. (Reproduced from paper by Cuthbert Wallace in *The British Journal of Surgery*, Volume IV, 1916-1917, page 679.)

a region excessively difficult of access; (d) patients who do not arrive until twenty-four hours or more after being wounded (Table II).

In transit to and whilst awaiting operation, patients should be given morphine in reasonable, but effective,

TABLE II.

591 Cases showing the Effect of Time on the Mortality. (After Wallace.)

Hours.	2	4	6	8	10	12	14	16	18	20	22	24 and over.
To have ..	3	30	75	55	34	19	7	4	11	4	0	27
Died ..	2	30	53	59	41	23	10	12	15	11	4	52
Total ..	5	60	128	114	75	42	17	16	26	15	4	79

dosage. After their arrival in hospital a period of rest and resuscitation is desirable, even though it is recognized that there exists a risk of a continuance of intraperitoneal bleeding. Warmth is supplied in all the usual ways, comfort is given by suitable posturing, and thirst is reasonably assuaged. The need of fluid is often great, and is met in most effective fashion by intravenous administration of saline solution, with or without glucose. All other routes are open to some valid objection. Blood transfusion before, during or immediately after operation will be according to the needs of the patient and the judgement of the surgeon. It seems probable that in future campaigns there will be a far more general use of blood transfusion for all severely wounded patients.

Those who have knowledge of the effect of blood transfusions upon the recently exsanguinated find it difficult to refrain from returning again and again to this theme. An element of drama is never absent, and is exemplified in the history of one such case.

A sorely wounded Canadian officer was given a blood transfusion in a dressing station and then brought down by aeroplane to a casualty clearing station. Here an abdomino-thoracic operation was performed, involving splenectomy and the suture of two gastric perforations. Upon his recovery and return to duty he gained the Victoria Cross and, finally, at the Armistice, led his regiment of Canadians into Cologne.

A matter for individual judgement, too, will be the determination as to whether a desperately sick man has become, or will ever become, an operable risk. With that hope in mind the question of further delay, obviously undesirable for other reasons, will be a matter calling for great judgement in decision.

Anæsthesia.

Since these abdominal operations are often lengthy, the value of the non-toxic gas anæsthetics does not need stressing. To many the memory of the improvement in results that followed the introduction of the rather primitive gas anæsthesia machines in 1917 is still a vivid one. The circulatory depression so generally present renders the use of spinal anæsthesia highly undesirable.

It is probable that some form of "open ether" administration will continue to be that most generally employed; but intratracheal anæsthesia may be preferable in abdomino-thoracic wounds. In the Great War it was established that the incidence of respiratory complications was notably decreased by the use of warmed ether vapour in Shipway's apparatus. Loss of heat was also minimized by the improvisation of methods for heating the operating tables.

Operation.

No single feature of the operation is of greater importance than the choice of an appropriate incision. The determination of this is naturally easier in the case of a through-and-through wound in which the site of visceral injury or injuries can be foretold in some measure. If a bullet or shell fragment is retained, an X ray examination, if this is feasible, will convey the required information. Any blind exploration, in ignorance of the ultimate site of lodgement, must involve far more handling of the viscera and prolongation of the operation.

The incision is planned solely with a view to adequate exposure of the damaged organs. If the wound of entrance or of exit is included in the incision, it will be an entirely

fortuitous happening and perhaps not an entirely desirable one. In any case, either now or later in the operation, such parietal wounds should be excised in accordance with the general principles of wound treatment. The incision, whether it is paramedian, the most generally useful, or transverse, must be of generous proportions. There is no place in this work for little half-hearted measures. It must be borne in mind that very often it is necessary to scrutinize the whole length of both small and large intestine, and that this can be properly done only under conditions of ample access.

The transverse incision in one of its several forms has probably more virtues than are generally recognized, affording excellent approach to ascending and descending colons, the associated flexures and, without change of position, to kidney and spleen. The bare or retroperitoneal aspect of the colon is easily explored and, if necessary, an artificial anus can be established at the posterior limit of an incision of this kind.

When the peritoneum is opened attention is generally first directed to the removal of the very large quantity of extravasated blood which rather obscures everything, the surgeon working with sucker, large absorbent packs, or by hand if much clot is present. A note is made at this time of any faecal smell, pointing to a large bowel injury. Free gas is seldom associated with anything but stomach wounds. The small bowel is the most frequently wounded viscus and, for that reason, the first one to be explored. Extravasation of contents is rarely a feature of wounds of the small intestine, but hæmorrhage is very free, particularly from the mesentery. For this reason it is subject to a scrutiny as careful and methodical as that given to the intestine itself; this scrutiny is usually made from the termination upwards. Bleeding points are picked up and perforations lightly clamped off during this survey. The perforations or wounds of the bowel are generally multiple and sometimes very numerous, and this fact has an intimate bearing upon the appropriate treatment. The surgeon handling such cases does well to remind himself continually of the likelihood of multiplicity of lesions and the possibility of involvement of other viscera, solid or hollow, in almost any combination.

The intraperitoneal lesion having been dealt with, further treatment will often be necessary in relation to the parietal wounds or the site of lodgement of the missile which has been responsible. Any appropriate treatment of these wounds is carried out, and this should include, whenever at all possible, removal of a retained fragment of shell or bomb (Tables III and IV). Gas gangrene arising in the muscles of the flank or back, or in the retroperitoneal tissues, is just as certainly fatal as any intraperitoneal cause of death.

TABLE III.
(After Wallace.)

	Bullet.	Shell Fragment.	Shrapnel.	Bomb or Grenade.
Out	203	30	15	6
Retained	131	254	67	128
Total	334	284	82	134

TABLE IV.
(After Wallace.)

	Bullet.	Shell Fragment.	Shrapnel.	Bomb or Grenade.
To base	91	106	15	60
Died	106	154	40	58
Total	197	250	55	118

Drainage.

The question of drainage is likely to be as fruitful a source of disagreement here as in the well-worn subject of appendicitis. It will be generally admitted that a complete toilet of the peritoneum is impossible in most cases, and few will hold that the continued presence of blood there is desirable. For this reason the insertion of a tube down into the pelvis (or any other site of dependent drainage) for twelve to twenty-four hours may do good and is exceedingly unlikely to be harmful. The excised wound-track itself may at times be made to play a part in such an arrangement.

When repair or anastomosis of the large intestine has been made, it is wise to leave a drain of folded rubber dam passing down to the vicinity. Despite an apparently flawless technique, subsequent events may demonstrate the wisdom of this course. The general principle governing the employment of drainage under conditions of imperfect hæmostasis applies in this work with redoubled force.

Closure of the Abdomen.

When utmost speed is called for there can be no question as to the necessity for all-layer closure by suitably spaced sutures. If time permits, a separate peritoneal closure before the tying of the through-and-through sutures is very desirable. A tendency to infection of the abdominal incision may be minimized by a light application of dilute "BLPP" before the sutures are tied.

Wounds of Special Organs.

TABLE V.

Relative frequency with which different abdominal organs are wounded. From a total of 965 cases (after Wallace).

Viscus.	Number of Wounds.
Stomach	82
Small gut	363
Colon	252
Liver	163
Spleen	54
Kidney	73
Bladder	45
Pancreas	5

Stomach.

In 55 of the 82 cases in which the stomach was perforated, it was the only hollow viscus damaged. On six occasions the posterior wall was the sole site of injury. Associated injury of the small gut occurred 19 times and of the colon 13 times.

Of the associated solid viscera the liver was wounded most frequently—on 15 occasions; the spleen was wounded five times, all wounds being fatal, the pancreas three times and the kidney four times.

The type of projectile and the inclination of its flight to the surface of the stomach determine the nature and size of the lesion produced. As a rule hæmorrhage is very free, into either the peritoneum or the stomach itself.

Laparotomy by paramedian incision is to be advised in all cases, except those mentioned earlier in which the wound is in the region of the cardiac orifice. Exploration of the posterior surface, when necessary, will be through the gastro-colic omentum. A tendency to ulceration at,

and secondary hæmorrhage from, the wound site, has been frequently noted.

In the 29 fatal cases, in which no injuries of other hollow viscera were present, shock and hæmorrhage proved fatal 15 times, whilst death was ascribed to peritonitis in only five cases. Thus it seems that, given the fullest possible facilities for replacement of blood loss, the mortality rate in stomach wounds of from 50% to 75% might be considerably lessened.

Small Intestine.

In 965 cases in which operation was performed, the small gut was found wounded 363 times. In 255 it was the only hollow viscus wounded. Almost every other abdominal organ is found wounded in association, particularly stomach, colon and bladder. The outstanding feature of small bowel wounds is the tendency to multiplicity of lesions, as many as 17 having been found. The average number is 4.8, and they are usually, but not invariably, fairly closely grouped. It is generally advisable to examine the whole length of the intestine methodically, including the mesentery. As far as possible, repair by suture is the treatment of election. However numerous the wounds, provided they are small, individual suture is best. Resection should be practised only when gross destruction of the bowel or of the mesentery leaves no choice (Table VI).

TABLE VI.
(After Wallace.)

Operation.	To Base.	Died.
Resection	26	87
Suture	59	71

The mortality rate in lesions of the small intestine alone is nearly 66%. It is even higher with associated lesions in other viscera. The incidence of death from peritonitis is about equal to that of death from shock or hæmorrhage.

Large Intestine.

The colon was wounded 252 times, on 97 occasions in association with another viscus. Multiple injuries are naturally far less common here, and when they occur are usually found at the flexures. Unlike the small bowel, the whole gut is seldom divided. Escape of contents is more frequently met than in the wounds of the jejunum or ileum, particularly from the right half of the colon. Two important characteristics of large bowel wounds must be carefully noted: the liability to penetration of the gut through its bare posterior surface in back wounds, and the occurrence of infarction from vascular injury. Retroperitoneal wounds, associated as they very frequently are with extensive hematoma formation, are difficult to find and carry a high mortality rate from sepsis or gas gangrene.

It is impossible, in a short paper, to discuss these cases as fully as one would wish, or even the best operative approach in differing circumstances. At times a paramedian incision, at times a transverse, and at others simple enlargement of a lumbar wound of entry will be found advisable.

Intraperitoneal lesions, when small, are treated by suture. When the injury is a gross one it is often better dealt with by exteriorization, an artificial anus thus being formed. The extraperitoneal type of injury to the ascending and descending colons is an important one. Even if it is practicable to repair the wound the freest of drainage must be provided, and often the soundest treatment is the formation of a lumbar colostomy at the wound site. Any hematoma present must be evacuated and explored, and the missile must be removed if this is in any way a possible procedure. Fraser's "colon septicæmia" is a frequent cause of death in cases of this type. Proximal colostomy is seldom of any value, except in wounds of the rectum.

The Liver.

The liver was found wounded in 163 cases, of which 148 were uncomplicated (Table VII). To these must be added 23 cases in which the liver was almost certainly wounded, but in which no operation was performed.

TABLE VII.
(After Wallace.)

Treatment.	To Base.	Died.	Not Known.
Operation (complicated) ..	14	28	4
Operation (uncomplicated) ..	72	32	—
No operation (no indication) ..	15	—	—

The large bulk of the liver probably accounts for the great number of wounds with which no other visceral involvement is present. The wound is, generally speaking, commensurate with the size of the projectile. Widespread fragmentation is less commonly seen than one might imagine from the nature of the liver substance, just as bleeding is, perhaps, less overwhelming.

The typical through-and-through bullet wound, to which the classical policy of non-intervention is so particularly adapted, is often accompanied by surprisingly few symptoms and comparatively little hæmorrhage. The injury produced by shell or bomb wounds, particularly when the fragment is of some size, tends not only to be a grosser one, but one in which death may result from the consequences of infection long after the earlier hazard of hæmorrhage has been weathered. These consequences may show themselves in the liver itself, in any of the subphrenic areas, as an infected hæmothorax, or as the dreaded secondary hæmorrhage. These risks are the greater with the lodgement and continued presence of shell or bomb fragment.

Given adequate facilities for unhurried operation, it is probable that in cases in which the retained foreign body is of some size operation is the best course, even though the immediate outlook appears excellent. Access to the dome has always presented difficulties. If subcostal incision, with, in suitable cases, the adoption of a semi-sitting position, does not give the required access, this may be obtained by division of costal cartilage and intercostal incision for the required distance after phreno-intercostal suture on either side. A coexistent hæmothorax may determine a direct approach through pleural cavity and diaphragm. A contaminated track is cleansed with gauze, and bleeding is usually better met by packing than by any attempt at suturing. The value of the postage-stamp graft or muscle tissue in hæmostasis should not be forgotten at such times.

Upon the other more commonly wounded viscera there is little comment to be made. The general principles of everyday surgery are applicable, if it is borne in mind that every case has a background, a background of contamination to some degree, with the likelihood of this becoming an established infection.

Conclusion.

It may be that conditions in other campaigns will be different. If this is so (which I doubt), and if facilities for the treatment of the exsanguinated are vastly improved—and we all look forward to such an improvement—the results of the treatment of abdominal wounds may make better reading.

To those unaccustomed to the casualties of war the mortality rates given may seem appalling. Many circumstances contribute inevitably to this, not least of which is a frequent multiplicity of woundings, any one of which, the abdominal lesion quite apart, would throw a strain upon the powers of recovery.

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British Medical Association News.**SCIENTIFIC.**

A MEETING of the New South Wales Branch of the British Medical Association was held on September 28, 1939, at the Robert H. Todd Assembly Hall, British Medical Association House, 135, Macquarie Street, Sydney, Dr. G. BARRON, the President, in the chair.

Mental Disturbances Associated with Cardio-Vascular and Renal Disease.

Dr. J. A. H. McGEORGE read a paper entitled "Mental Conditions Associated with Cardio-Vascular and Renal Disease" (see page 959).

Dr. OLIVER LATHAM had looked forward to Dr. McGeorge's paper with considerable interest and had found many of his experiences in accord with his own. Dr. McGeorge had admitted the subject to be a wide one, and Dr. Latham proposed to confine himself to one aspect, and that was the local oedema present in the brain in cases of kidney dysfunction. On the one hand, whole lobes, or at least gyri, might be involved; on the other, innumerable microscopic areas. He had brought along some slides of photomicrographs to illustrate these points. His first slide showed a cortical vessel a millimetre in diameter, and quite sound, but near by were innumerable areas of "état criblé", whose capillaries were encrusted with lime or iron and poorly functioning. Professor Lambie had sent this nephritic brain for a report on the cerebral state. Another slide showed a close-up view of these bogged areas. It was explained that some lessening of this oedema constantly took place with improvement in the patient's mental clarity. The third slide showed a small patent vessel with hyaline walls from the temporal lobe of a nephritic patient subject to frequent bouts of mental confusion, but in the intervals able to carry on his trade as a painter. The neighbouring capillaries had their walls thickened by cellular proliferation, causing narrowed lumens. The points here were that the myelin stained badly; the interfascicular glia was swollen by imbibition besides revealing many branching glia cells; all of this denoted constantly recurring bogging. Dr. Latham said that recent authorities ruled that excess glia about a vessel, even when patent, was good proof that the vessel was functioning inadequately. Mallory's phosphotungstic hæmatoxylin stain revealed this perivascular gliosis nicely, and might be applied to formol-paraffin sections after a night in Weigert's two mordants and a few minutes in 0.25% potassium permanganate solution followed by 1% oxalic acid.

Next followed two slides from an old man in a good position, who, however, had rapidly become demented. His neuroglial framework had become almost waxy, especially in the olives and a round his cortical vessels, visible almost without staining. A slide followed, stained by von Braunmühl's silver method. This brought out the so-called senile plaques and argentophile meshwork of reticulum fibres round the blood vessels of an arteriosclerotic patient, quite unsuspected during life. Another slide presented an example of miliary infarct, wherein on one side of a cortical arteriole normal neurones obtained, while on the other side no neurones could be found, but only small glial cells so regularly arranged on apparently the usual cerebral background that the area might easily have been missed. Innumerable lesions like this might well cause mental hebeteude.

The eighth slide showed microscopic softening, "état criblé", thick-walled vessels (proliferated cells), small hæmorrhages and scattered *Gitterzellen* in early cerebral syphilis. Here too oedema was evident. The next slide showed a photomicrograph of the superficial cortex of a general paretic; the section was prepared by Ford Robertson's methyl violet technique. Well seen were the thickened pia, mononuclear infiltration, subpial felling and proliferated obstructed cortical capillaries and gliosis.

Well known was the capacity of patients with brains of this type to recover a great deal from their confusion, especially after cerebral draining, in which Nature often took a hand by diarrhoea, diuresis and such like. And these brains often shared with those of alcoholics the epithet "wet".

The last slide revealed a cross-section of the *iter* of a boy, aged nine years, whose brain and cord had been referred to Dr. Latham by the late A. W. Campbell, who sought some reasons to account for the boy's paralysis and sudden death after his first (recorded) fit. His cortex showed evident arteriosclerosis, but nothing "specific", while two collections of lymphocytes had been noted in his *cauda equina*. It was to be regretted that it took several years to evaluate properly the typical granulations readily visible in the ependyma of the *iter*, which almost certainly proved that the lad had had congenital general paralysis and had died in his first "congestive" attack. Dr. Latham also showed a few slides under a microscope, one showing perivascular gliosis round a vessel in the medulla of a young man who in life was considered physically intact. The stain was Mallory's.

Dr. A. T. EDWARDS expressed his appreciation of Dr. McGeorge's paper, which had entailed much work. Dr. Edwards regretted that so few members were present to hear the address. Deliberately induced hæmorrhage had actually been introduced as a form of treatment by one Jackson, of America, who had recently reported six cases of schizophrenia in which he had used the method. Jackson withdrew three-quarters of the total blood and replaced it with fluid. Recovery occurred in about five cases. Dr. Edwards remarked that this was a very drastic form of treatment. With regard to pernicious anemia, Dr. Edwards said that most of the patients he had seen who were suffering from mental symptoms in association with pernicious anemia were of the paranoid type, and in many cases the delusions were dependent on physical manifestations. One woman known to him developed delusions that the neighbours were putting yellow powder on her and making her into a Chinese; a man who had spinal cord changes said that the Bolsheviks were throwing "dinky dyes" into his legs. Both of these patients recovered. Dr. Edwards then referred to the diminution in the length of illness and confusional state of patients admitted to hospital suffering from a failing heart, who were treated by the new diuretics, such as "Neptal" or "Salyrgan". Their administration had led to a much more rapid improvement than the older measures, and Dr. Edwards wondered whether this was due to the removal of the edema in the brain. He suggested that this was probably due to the diuretics. Finally, Dr. Edwards pleaded for delay in certification of patients admitted to hospital with a failing heart. He said that he knew that they were restless and resistant to treatment, and confused; but if they could be looked after in public hospitals, especially in those with mental observation wards, they need not be certified, and the unfortunate stigma attached to certification would be prevented. Moreover, in very few cases would they need restraint for more than a few days. Those admitted to mental hospitals were either dead within two days or within a week had become rational, cooperative and among the best patients.

Dr. McGeorge, in reply, said that he had been interested in Dr. Latham's remarks about the diminution of cerebral edema that occurred with rest; Dr. McGeorge did not doubt that many of those patients suffering from mental symptoms did improve with rest. That form of treatment could be successfully used in the ordinary delusional states or in delirium, but it was very difficult in acute confusion. The slides shown by Dr. Latham certainly had added point to Dr. McGeorge's paper; practical demonstration of the actual changes found microscopically in such cases was much more impressive than all that could be said. Such a demonstration made one realize how important was the part of the neuro-pathologist in psychiatry. Too many psychiatrists were given to fantastic theories, and it was interesting to see things such as those shown by Dr. Latham. Dr. McGeorge uttered a plea for more scope for the neuro-pathologist.

Dr. McGeorge said that he had been interested in Dr. Edwards's statement about the paranoid. Most of Dr. McGeorge's patients had suffered from confusion. He was also interested in the idea of the removal of large quantities of blood; he had mentioned this form of treatment in his paper when referring to the woman who had recovered after a severe rectal hæmorrhage. Dr. McGeorge did not, however, recommend rupture of a rectal vein as a form of therapy. He considered that the removal of large quantities of blood was an heroic method of treatment, and thought that there might be better methods than such measures. Dr. McGeorge was interested in Dr. Edwards's remarks about diuretics. He thought it possible that they might exert an influence, not only through the removal of cerebral edema, but also through the removal of the toxic products which played such a large part in the production of cerebral disorders. Experiments carried out at the Mental Hospital, Parramatta, had supported this theory. Dr. McGeorge said that good results had been obtained in a case of cerebral confusion by the intravenous use of hypertonic saline solution. Thirty cubic centimetres were given very slowly, at the rate of 0.5 cubic centimetre per minute, and the result had been a rapid decrease in the pressure of the cerebro-spinal fluid and a diminution of the patient's restlessness. The same result could be obtained more simply by the rectal administration of dextrose or by the giving of sodium sulphate by mouth in drachm doses every hour until very fluid motions were obtained. By these methods the results were more slowly obtained, but were equally satisfactory, and Dr. McGeorge thought the methods could be used in some cases of excitement. With regard to people with cardiac lesions, however, it was a different matter; it was hard to find any hospital that could control them. They were nursed in wards with other cardiac patients, where any disturbance was likely to cause grave trouble, so they were early removed to the Reception House. They were kept there for quite a long time; if there was any possibility of their recovery they were kept for as long as three weeks or a month. However, if they deteriorated mentally and their physical condition was good, they had to be sent to a mental hospital. Dr. McGeorge agreed with Dr. Edwards that such patients, if they were going to die, died very quickly. It was a pity that there were not wards in public hospitals where they could be treated. Dr. McGeorge remarked that it was possible that there was a stigma attaching to mental hospitals, but it attached also to the Reception House. Dr. Wallace, Inspector-General of Mental Hospitals, had mentioned this fact at an earlier meeting. In conclusion, Dr. McGeorge thanked those who had spoken, particularly Dr. Latham, for the slides he had shown.

Dr. Barron, from the chair, expressed his thanks to Dr. McGeorge for his interesting paper, and regretted that the bad weather had meant such a small attendance at the meeting.

A MEETING of the New South Wales Branch of the British Medical Association was held on July 20, 1939, at the Women's Hospital, Crown Street, Sydney. Part of the report of this meeting appeared in the issue of December 23, 1939.

Recurrent Toxæmia of Pregnancy.

Dr. JOHN CHESTERMAN showed his first patient to illustrate the effect of toxæmia occurring during successive pregnancies. He said that the patient had had six confinements and had been in the Women's Hospital for five of them. She had been first admitted to hospital early in 1932, when aged twenty-eight years; she was then six and a half months pregnant and had *ante partum* eclampsia. She had had no antenatal care, and had first received medical attention during an eclamptic fit. On admission to hospital she was semi-conscious; her systolic blood pressure was 190 and her diastolic pressure 120 millimetres of mercury, and her urine was scanty in amount and "solid" with albumin on boiling. There was pronounced generalized edema and the blood urea level

was 46 milligrammes *per centum*. The patient had no further convulsions, and towards the end of the first week in hospital her condition improved considerably; the blood pressure had fallen to 150/100 millimetres of mercury, and the albuminuria to less than "one-quarter". During the second week her condition became worse again; this was indicated by an increase of albumin in the urine and a rise in the blood pressure to 200/130 millimetres of mercury. Induction of labour had been attempted medicinally without success, and so delivery was effected twenty-four hours after surgical induction, the infant being premature and stillborn. Improvement followed and the patient was discharged thirty days after her admission to hospital and ten days after delivery. Her urine then contained no albumin and her blood pressure was 140/100 millimetres of mercury.

In June, 1932, she was for four weeks an in-patient at Lewisham Hospital, suffering from nephritis, and in December, 1932, she had cholecystectomy performed, also at Lewisham Hospital. Dr. Chesterman said that during her second pregnancy, in 1933, the patient was in the care of Dr. T. J. Connelly, and Dr. Chesterman was indebted to him for the record of this pregnancy. During the last three months she had albuminuria, the albumin varying in amount. She had suffered from oedema, and the systolic blood pressure had varied between 140 and 170 millimetres of mercury. She had been delivered of a living child on June 9, 1933, and had been discharged from a private hospital on June 22, with mild albuminuria and blood pressure raised slightly above normal.

In June, 1935, she was again admitted to the Women's Hospital, seven and a half months pregnant in her third pregnancy. She had generalized oedema, a blood pressure of 200/130 millimetres of mercury, and the urine was "solid" with albumin on boiling. Although her blood pressure fell slightly during the following four days, the massive albuminuria persisted. Surgical induction of labour was undertaken and she was delivered of a premature child, which survived. At once her condition began to improve, and ten days *post partum* the blood pressure was 140/98 millimetres of mercury and the albumin in the urine had diminished to "one-eighth" on boiling. A urea concentration test (MacLean) performed during the first week of the puerperium indicated pronounced renal inefficiency, the highest concentration of urea in the urine during the test being 1.62%. The blood urea level was 17 grammes *per centum*. The patient contracted pyelitis during this puerperium and was in hospital for eight weeks.

In May of the following year she was again admitted to the hospital, seven months pregnant, and again suffering from generalized oedema; the blood pressure was 210/142 millimetres of mercury, and the albumin in the urine varied in amount from "one-half" to "three-quarters" on boiling. A urea concentration test again revealed pronounced renal inefficiency, the highest concentration of urea during the test being 1.6 grammes *per centum*. The blood urea content was 26 milligrammes *per centum*. There was no improvement after four days, so delivery was effected by surgical induction, the infant being premature and stillborn. Improvement followed this procedure, and at the end of six weeks the patient's blood pressure was 140/110 millimetres of mercury, and the urine was usually free from albumin or contained a trace.

Dr. Chesterman said that sterilization by operation had been suggested to the patient after this pregnancy, but her husband was unwilling. A year later, in June, 1937, when pregnant for the fifth time, she came back to the hospital in the tenth week of her pregnancy, instead of about the twenty-eighth week, as in previous pregnancies. Her renal and vascular system showed the effect of pregnancy in a correspondingly less degree. The blood pressure was 160/110 millimetres of mercury; the urine on boiling contained "one-quarter" albumin. The kidneys' power of concentrating urea was surprisingly good, the highest concentration during a test being 3.3 grammes *per centum*. The blood urea content was 15 milligrammes *per centum*. With rest in bed during the following four weeks there was still further improvement, the blood pressure on some occasions being as low as 120/80 millimetres of

mercury, and the urine free of albumin. At the seventeenth week of pregnancy, however, in spite of rest and careful treatment, the blood pressure commenced to rise and albuminuria was again present. In view of the patient's history the pregnancy was terminated. On her discharge from hospital four weeks later her blood pressure was 135/80 millimetres of mercury and occasional mild albuminuria was present.

The patient became pregnant again, for the sixth time, and was admitted to the hospital on March 4, 1939, when seven months pregnant. She had been vomiting and had suffered from severe headache. Her blood pressure was now 260/150 millimetres of mercury, she had generalized oedema, and the albumin in her urine varied in amount from "one-quarter" to "three-quarters" on boiling. Her blood urea content was 36 milligrammes *per centum* and the blood uric acid content five milligrammes *per centum*. Labour was induced surgically and resulted in the premature delivery of a stillborn infant. Following this the fall in blood pressure and the decrease in the amount of albumin in the urine were very slow. Eight weeks later the blood pressure was 195/135 millimetres of mercury, and the amount of albumin varied from "nil" to "one-third" on boiling. A urea concentration test at this time revealed that the kidney was capable of concentrating urea only to 1.7 grammes *per centum* in the urine. The blood urea content was 32 milligrammes *per centum*. The patient was sterilized by operation.

Dr. Chesterman said that at the time of the meeting the patient was feeling well, although her blood pressure was 190/110 millimetres of mercury and albumin was present in her urine. Dr. Chesterman said that it was unusual to have the detailed history of such a patient during six pregnancies. Her constitution seemed to be inherently incapable of adapting itself to the metabolic changes occurring in pregnancy. He considered that the same toxæmic process had recurred in each pregnancy. After each pregnancy the cardio-vascular and renal system would seem to have made a considerable degree of recovery, as illustrated by the findings at the tenth week of her fifth pregnancy. However, the repeated pregnancies had now caused permanent damage. Dr. Chesterman said that he would expect some still further recovery, particularly of the renal lesion, but the patient would be left with permanent hypertension.

Essential Hypertension and Pregnancy.

Dr. Chesterman's second patient was a woman who had been admitted to the hospital during her seventh pregnancy, at the age of forty-six years. She had had six apparently normal pregnancies (the last of which had been eleven years previously), resulting in six normal infants, all of whom were still alive. During this seventh pregnancy she had attended the antenatal department of the hospital when twenty-five weeks pregnant and again when thirty weeks pregnant. On each occasion her urine contained no albumin, but unfortunately her blood pressure had not been recorded. When thirty-six weeks pregnant she had been admitted to the hospital complaining of slight shortness of breath on exertion and some swelling of the ankles during the previous fortnight. On examination she was found to have slight hypertrophy of the left side of her heart; a soft systolic murmur was audible at the mitral area and a pronounced accentuation of the second sound was heard at the aortic area. The systolic blood pressure was 250 and the diastolic pressure 120 millimetres of mercury, and the urine was free of albumin. The blood urea content was 17 milligrammes *per centum*, and a urea concentration test revealed a satisfactory concentration of urea in the urine. During the next twelve days the patient's blood pressure varied between 200/120 and 248/120 millimetres of mercury, and the urine was consistently free of albumin. Labour was induced surgically and a live child was delivered. A week after delivery the blood pressure was 200/120, and ten days later it was 175/100 millimetres of mercury. Dr. Chesterman said that at the time of the meeting, which was nearly four years after the pregnancy described, the patient was still well. She complained of occasional giddy

turns and shortness of breath on exertion. Her blood pressure was 190/100 millimetres of mercury and there was no albumin in her urine.

Dr. Chesterman pointed out that, in contrast with those of his first patient, the pregnancy of this patient had not been associated with toxæmia. He considered it almost certain that she had had pronounced hypertension with absence of renal changes before the occurrence of pregnancy, which was merely a coincident event and one which had had very little effect on the course of her preexisting cardio-vascular disease.

Cinematographic Films.

Two films were presented by courtesy of the Petrolagar Company. The first dealt with trichomonas infection in the vagina, and was in colour. Besides revealing the field possible in clinical medicine for the cinematographic film, it was instructive. The photographs taken through a microscope of moving trichomonads were particularly fine.

Dr. De Lee's film of eclampsia illustrated the conservative treatment as carried out in the patient's home. It was greatly appreciated, not having been shown in New South Wales before.

A MEETING of the Victorian Branch of the British Medical Association was held on July 19, 1939, at the Alfred Hospital, Melbourne. The meeting took the form of a number of clinical demonstrations by members of the honorary medical staff of the hospital and of a symposium on the use of sulphanilamide.

Complicated Fractures.

Dr. A. J. TRINCA showed a series of patients with complicated fractures, who at the first examination and in the early stages of treatment had been given a grave prognosis with regard to a good functional result. Perseverance with treatment, however, had shown how great an aid had been afforded by the natural processes of restoration and repair.

An unexpectedly good functional result had been obtained in all cases in spite of the fact that in two there had been gross disorganization of joints with involvement of the articular surfaces, in another multiple fractures with serious disturbance of blood supply in an old man, in another osteomyelitis of nine months' duration with recent septicæmia associated with a compound fracture, malunion and three and a half inches of shortening, and in the last case gross comminution of the femur with complete detachment of large pieces of bone from the periosteum.

The first patient was a female, aged twenty years, who had sustained gross injury to knee joint. She had now a joint that functioned well.

She had been admitted to hospital on October 29, 1933, after having been involved in a head-on collision between a motor cycle and a motor truck.

On examination she had a large, dirty, lacerated wound involving the knee joint and lower portion of the thigh; it was bleeding freely and showing loose pieces of bone. The tendon of the quadriceps had been torn off the patella and the patella had been pushed backwards into the posterior compartment of the joint. Both cruciate ligaments were torn off the femur attached to pieces of the intercondylar notch. The lateral meniscus was lying free in the joint.

In the femur there was a vertical fracture extending into the knee joint, with comminution of the lateral condyle. The head of the tibia was crushed, with gross irregularity of the articular surface.

At operation contaminated skin edges and soft tissues were excised, small pieces of bone, both crucial ligaments and the lateral meniscus were removed, fragments were apposed as far as possible, and the limb was fixed in a position for ankylosis. The wound healed by first intention. On removal of the plaster on December 3, 1933, it was found that no ankylosis had occurred, but that there

was a range of flexion to about 45°. The patient was discharged from hospital on December 12, 1933.

Examination at the time of the meeting revealed a remarkably good recovery. There was an almost complete range of painless movement, no abnormal mobility, and the girl could walk without a limp and run for a train.

Dr. Trinca said that this was hard to appreciate after examination of the X ray appearances of the joint, which revealed gross irregularity of the articular surfaces. A good layer of cartilage, however, was present.

Dr. Trinca next showed a male, aged fifteen years, who had sustained a fracture of the humerus involving the elbow joint. The patient had been admitted to hospital on April 9, 1939, four days after being involved in a motor car accident. X ray examination of the right elbow joint revealed a vertical T-shaped fracture of the lower quarter of the humerus through the olecranon fossa, with wide separation of fragments and upward displacement.

At operation it was found impossible completely to approximate the two condylar fragments, and the joint was left with a space between the capitellar and trochlear portions of the articular surface of the humerus. On April 28, 1939, he was discharged from hospital wearing a plaster mould. At the time of the meeting the patient had free painless movement at the elbow joint, and a complete range of pronation and supination; extension was limited by 10° to 15° and flexion by about 30°. The elbow was capable of further improvement by means of continued physical therapy.

Dr. Trinca then showed a male, aged seventy-two years, who had sustained multiple fractures. He had been admitted to hospital on March 19, 1938, after having been struck by the bumper bar of a motor car on the left leg and thrown to the right. On examination he was found to have seven fractures in addition to injuries to the soft tissues. In the right femur there were a subtrochanteric fracture and a comminuted fracture at the junction of the middle and distal thirds. In the left tibia there were a comminuted fracture in the upper fourth, a comminuted fracture in the middle, with fissuring leading to the upper fracture, and a supramalleolar fracture. In the left fibula there were a fracture in the upper fourth and another in the lower third.

It was thought on account of the man's age and poor general condition that union was unlikely; but treatment in extension was persisted with, and on May 18, 1938, an X ray examination revealed that union was progressing satisfactorily.

On July 8, 1938, there was firm union in the femur, with good callus formation.

On August 30, 1938, he slipped and refractured his right femur. Union in the left tibia was much slower and was not firm until November 8, 1938.

At the time of the meeting he had firm union of all bones in good alignment and without shortening, and walked with the aid of a stick.

The fourth patient shown by Dr. Trinca was a male, aged thirty-two years, who had been admitted to hospital on January 22, 1937. Nine months before he had sustained a compound fracture of the right femur in a motor car accident and had been treated in the country, at a place where there were no proper facilities for modern fracture treatment. At the time of his admission malunion of the fracture and osteomyelitis were present. He weighed only seven stone and was suffering from staphylococcal septicæmia with severe anemia and toxæmia. The right thigh was swollen and had a large infected wound anteriorly, in the depths of which bare bone was visible, and five other large sinuses discharging pus. X ray examination revealed a fracture in the middle third, with overlapping and angulation of fragments and three and a half inches of shortening. The fragments were united by soft callus.

After treatment of his general condition by means of the intravenous administration of saline solution, the limb was put up in extension; this was gradually increased until the soft callus gave way and correct alignment was obtained. Residual abscesses were opened and recovery from septicæmia occurred, with considerable improvement in his general condition.

On July 29, 1937, a large sequestrum, three and a half inches long, involving the whole thickness of the femur, was removed. This was lying in a thin bed of callus, which connected the original ends of the femur. On December 15, 1937, the callus had grown and consolidated sufficiently to allow him to be discharged from hospital wearing a walking caliper. At the time of the meeting he weighed twelve stone and firm union was present, although small sequestra were still being discharged, and he could walk without any support. The prolonged extension had resulted in an ankylosed right knee joint.

Dr. Trinca then showed a male, aged thirty-seven years, who had been admitted to hospital on November 19, 1938, having been struck on the right thigh by a motor car. An X ray examination revealed extensive comminution of about six inches of the lower third of the shaft of the femur; large fragments were lying transversely and obliquely in a position of gross displacement.

At operation on November 29, 1938, a large hæmatoma was found in the lower third of the thigh, in which were two large fragments, one five inches and the other four inches long; they were lying free and completely devoid of periosteum. These and other fragments were apposed as far as possible and bound into position by thick catgut and the limb was put up in extension.

On January 22, 1939, union appeared to be progressing, and on April 25, 1939, extension was discontinued. On May 14, 1939, he was discharged, walking on crutches.

At the time of the meeting the patient was able to walk with the aid of a stick, and X ray examination revealed firm bony union, the loose fragments apparently having united without replacement, as in the case of a bone graft.

(To be continued.)

University Intelligence.

THE UNIVERSITY OF MELBOURNE.

On Friday, October 27, 1939, a meeting was held at the Union Building, University of Melbourne, for the presentation to Sir James Barrett of his portrait, painted by Mr. Charles Wheeler. The subscribers to the fund included members of the university council and staff, medical graduates and other citizens. The portrait, which was given by Sir James Barrett to the University of Melbourne, will be hung in the Wilson Hall.

Councillor A. W. Coles, Lord Mayor of Melbourne, said:

On behalf of the subscribers I have the honour and the pleasure of presenting to the University of Melbourne this portrait of Sir James Barrett, and I do hope that it will be hung on these walls, where it may be seen and appreciated for all time.

In presenting this portrait I take the opportunity of expressing the indebtedness of Melbourne to one of its most able and illustrious citizens, one whose ideal throughout a long and busy life has been "service to the community". Sir James Barrett is a citizen with an extraordinarily wide range of interests, and it is characteristic of him that he has developed each interest with thoroughness, and given the full benefit of his findings and conclusions to the community. I do not profess to have a knowledge of all his associations and activities, but I am informed that he has retained to this day his active interest in no fewer than twenty-eight committees, of which he is president of eleven, vice-president of two, chairman of seven and honorary secretary of three. It is only a few months ago that two new honours came his way, to testify to the renown he has won, both here and overseas, for he was awarded a Fellowship of the Royal Australasian College of Surgeons, of which he is a foundation member, and a Membership of the Zoological Society of London. I may here perhaps pay a special tribute to the services rendered by Sir James in the Great War. He was a colonel of the Australian Army Medical

Corps, and consultant in eye and ear troubles with the forces, as well as registrar of the First Australian General Hospital and assistant director of Australian Medical Services in Egypt. In these capacities he brought to bear his wide experience of science, and it has been said of him, as an enduring tribute, that he never undertook a job of work, however small, without attacking it thoroughly with all his heart and mind until it was completed.

I think that one of the most endearing and human characteristics of Sir James is his love of Nature. I do not know if it is generally known that the great Wyperfeld National Park, at Pine Plains, in the Mallee, about twenty-five miles north of Rainbow, is a monument, a magnificent monument, to Sir James Barrett the naturalist. And that it is to him, and his untiring devotion to the care of our native fauna, that we owe the sanctuary established at Wilson's Promontory. I might also call him the discoverer of Mallacoota, for certainly it was he who first sang its praises as a Gippsland Garden of Eden. Then again the koala owes a great deal to his research into its peculiar diet, and we acclaim Sir James among the little band of enthusiasts who have succeeded in saving this lovely little national favourite from extinction.

One of his hobbies is the cult of lilliums, and Sir James is recognized as one of Australia's foremost authorities on lilies.

His diversity and capacity for work are equally amazing, and it is well known how far-reaching is his influence in educational and humanitarian movements. He has ever been an advocate for decimal coinage and proportional representation. Perhaps the greatest of all his achievements, however, is the magnificent work he has done for the Bush Nursing Association, which brought to so many small country towns of Victoria a hospital service of extraordinary efficiency. His influence in the realm of music has been largely responsible for the good work of the Lady Northcote Permanent Orchestra Fund, and the Returned Soldiers' Military Band, while the community is further indebted to him for his interest in promoting life-saving, of improvement in wireless programmes, establishment and equipment of children's playgrounds, town planning, promotion of Japanese friendship, the inculcation of Empire and League of Nations ideals, the care of neglected children, the hand of friendship to new settlers, and the development of the Botanical Gardens.

I doubt if we have ever had another citizen with such a wide range of influence, and the honour we seek to pay him today is quite inadequate to repay our debts to him.

Melbourne is very proud of Sir James Barrett. I hope that he will long be spared to direct the activities so dear to his heart, and that all who within these noble walls look upon that portrait will not fail to salute him as one of the greatest living benefactors of our country and our time.

Mr. Chancellor, it gives me much pleasure to have the honour to present to you, on behalf of the subscribers, this portrait of Sir James Barrett.

Mr. Herbert Brookes said:

I have been acquainted with Sir James Barrett since the summer of 1887, when he took me under his wing on a trout fishing expedition to Tasmania, just after he returned to settle down as a specialist, having added distinction to his university career by his success abroad.

That acquaintanceship developed into a friendship over the years during which I had occasion to admire and marvel at his activities. For the past fifty years every movement of any consequence for the benefit of society and the improvement of the social structure has had some measure of support from Sir James Barrett, and many of them have been initiated and maintained and supported by his labour and more or less at his expense.

The Lord Mayor has recalled for you many of the leading features of such activities. It remains for me to refer to several that he has missed, and anyone who follows me will likewise be able to add others I have missed, so manifold have been his activities.

I would specially stress his work for the symphony orchestral movement in this city. For many years it owed its existence mainly to his efforts and financial aid. He never slackened in his endeavours until the Broadcasting Commission took it under its wing. And even now he watches over it.

Then there was the development of the Conservatorium of Music in connexion with this university. This institution has been one of his special interests. He has the credit too of having been the first to discover the unusual potentialities of Professor Bernard Heinze, and was responsible for his selection for the Ormond Chair more than anyone else.

Then there is the work he has done for the protection of our parks and gardens and for the national parks and reservations; for the historical memorials all over this State; the proportional voting organization and the Lady Northcote Trust, for which, along with the Children's Playgrounds Trust, he was mainly responsible.

Finally I mention the Royal Empire Society, which could not have survived without his fostering and continuous care.

These are all activities outside the university. Now let me touch briefly on a few of those within this institution. Many of you are as familiar, and some even more so, than I am with his work in and for this university. All along the line he has exercised a liberalizing influence and has been the protagonist of scientific education in its struggle for a place with classical education. He was responsible for the pioneering work which resulted in the materialization of the School of Education, Agricultural Education, the Mining School, the School of Commerce, Veterinary Science, University Extension.

I leave it to others to refer to his other activities as a member of the medical staff, his visits abroad, his military service, and still there will remain much to be told.

When this portrait hangs in the Wilson Hall the generations of students of the future will look up and marvel, as we have done and still do, at this dynamic and public-spirited benefactor of society.

The Chancellor of the University (Sir John Latham) said that he received the portrait of Sir James Barrett on behalf of the university with the greatest pleasure. In honouring Sir James Barrett they were paying a tribute to a distinguished citizen, who had rendered great service to the community as a whole and particularly to the university. Previous speakers had spoken of his many activities in important and valuable public movements. Sir James Barrett had been associated with the university during practically the whole of his life. It was not sufficiently known that he had acted as a lecturer in the medical schools for forty years without salary. He had been a member of the council since 1901 and had taken a very large part in the university administration since that date—in recent years as deputy chancellor and as chancellor. Sir James had also been a generous benefactor of the university. As one of the leaders of his profession he had been very active in relation to the medical school, but he was almost equally interested in all the developments of science and in the promotion of culture in nearly every form. He had taken a leading part in the musical life of Melbourne in connexion not only with the Conservatorium of Music but also with other organizations and institutions. The portrait so ably executed by Mr. Charles Wheeler would be a lasting memorial of one to whom the university owed a great debt.

Professor H. K. Bailey said:

In the absence of the Vice-Chancellor, which we all regret, the honour has fallen upon my office of supporting in a word or two what the Chancellor has said in accepting this portrait—this very distinguished portrait, if I may presume to say so—on behalf of the university.

Those of us who spend our working lives within the walls of this place know that it is simply not possible to over-estimate the energetic, manifold, devoted, honorary services which our guest of today has for so long rendered to the university. At every point one is reminded of that. Only this morning, if I may thus illustrate the

great range of Sir James Barrett's interest in university affairs, the Vice-Chancellor and I were able to solve one of the personal problems created by the outbreak of war, by resort to one of the most far-sighted of his many benefactions to the university—a gift made more than twenty-five years ago. Any picture of the University of Melbourne, at any time in the twentieth century, which omitted him and his work would be nothing but a mere distortion.

I think it was the Vice-Chancellor who suggested that, since the portrait itself will remain with us here at the university, it would complete the gift if the subject of the portrait would himself accept some small permanent memento of the occasion. There is here a silver salver, which bears the following inscription: "Presented to Sir James William Barrett, K.B.E., C.B., C.M.G., LL.D. (Manitoba), M.D., M.S. (Melb.), F.R.A.C.S., F.R.C.S. (England), C.M.Z.S., Chancellor of the University, 1938/39, by the subscribers to his portrait on the occasion of his retirement from the Chancellorship of the University of Melbourne." On behalf of the contributors I now have the great honour of asking Sir James Barrett to accept it from us.

Sir James Barrett, in reply, said:

I have to thank profoundly those who have enabled this portrait to be painted and to thank the University Council for agreeing to place it in the Wilson Hall. The honour is deeply appreciated by my family and myself. I have also to express to Mr. Wheeler my cordial thanks for the immense amount of trouble he took to make the portrait as presentable as the subject matter permitted. I was greatly interested in the infinite pains taken by him.

I entered the university sixty-two years ago, at the age of fifteen. It contained 200 students and the third-year medicine—when I reached that stage—was the largest that had been known, as there were ten of us.

After graduation and two years at the Melbourne Hospital as a resident medical officer I went to London and became a demonstrator and lecturer in physiology in King's College, London, in addition to doing clinical work in various hospitals and some work in Berlin, with visits to Leipzig and Vienna, and also visits to clinics at Liège and Utrecht.

On return to Melbourne some years later I was appointed demonstrator in physiology in the University of Melbourne and later lecturer in the physiology of the special senses, an office which I held for some forty years.

Such is the educational background; but the larger side of university work began in 1901, when I became a member of the University Council and had immediately to face the complications following the discovery of the Dixon frauds and to aid in vigorous action, as I became one of a committee of four appointed to advise on the reorganization of the university, both from the administrative and educational points of view. This was finally effected with the aid of the Government of Sir Thomas Bent in 1904. But the obstacles were many.

The staff of the university contained men of the greatest ability. I name them as they were known subsequently, as most of them were knighted: Sir Orme Masson, Sir Charles Martin, Sir Baldwin Spencer, Sir Thomas Lyle, Sir Harrison Moore, Sir Harry Allen, Professor Gregory and Professor Tucker. It was a remarkable collection of eminent men, who were essentially gentlemen in the widest sense of the word. I doubt whether any university was ever more brilliantly staffed. Yet the public attitude was one of indifference and even bitter hostility, and the attitude of many members of the university—but not all—was opposition to new courses of study and to changes.

My activities from that time until the outbreak of the War were largely devoted to combating both these difficulties, and I was actively supported by Sir John MacFarland, Sir Leo Cussen and Mr. Frank Tate.

The public attitude was met by the appointment of new faculties, of external members of the faculties, and the extension movement and the creation in elementary form of what is now the union, and, of course, a public campaign,

which is recorded in part in my publication "The Twin Ideals".

The opposition to new courses of study was more difficult to meet as we were told nothing new should be undertaken until the existing departments were properly provided for. This, of course, meant that nothing new would ever be undertaken, as there is no limit to the legitimate aspirations of any department. When the controversy was at its height I visited the United States of America and was interested to meet the professor of educational administration at Harvard University, Professor Hanus, who was then investigating the educational administration of schools in New York containing 800,000 pupils. He said, in a rather off-hand manner: "Oh, yes, I know; the perfection of existing courses argument", and gave me the impression that he regarded it as finished. But, of course, there are two sides to this question. New courses, properly designed and supported, bring new interests and, as they interlace with the established courses, strengthen them also. No sensible man advocates new courses just because they are new. They may be desirable or even essential, but careful examination is requisite.

I aided, to the extent of my capacity, the provision of leave for members of the staff to visit overseas universities periodically. This system gives them a knowledge of what other universities are doing in their special departments and provides personal contacts of great value. The account furnished by the Ormond Professor of Music of his activities during his recent year's leave, and similar reports from other members of the staff, show how necessary these visits are. Knowledge is thus obtained which would be otherwise unobtainable.

On return from four and a half years of military service I found that the number of students had risen from 1,200 at the outbreak of war to about 2,000, and that there was serious overcrowding. Action was soon taken by the Government of Mr. (later Sir) Harry Lawson, and no sketch can be complete without reference to his decisive action, taken after careful inquiry, to put the university on a solid foundation. It was the act of a statesman who understood its importance. Lately the university has had occasion to be grateful to the present Premier, Mr. Dunstan.

What, then, is it that is now requisite? Money, of course, but also internal alterations—not necessarily expensive. What are the deficiencies? With proper respect to those who may not agree with me, let me set out the problems in outline.

The university as a whole does not watch general alterations of policy of universities in other places, and that was in mind when Dr. Priestley and Mr. Foster were asked by the council to examine American and British universities. I regard our university, like many British universities, as too conservative, though conservatism to a certain extent is essential. The American universities in this regard show greater initiative, whilst keeping their solid foundation. Let me give two examples. Their extension system is very comprehensive and anyone connected with a public discussion turns to the university for help. That attitude will, I think, develop here; but the fact remains that I am continually applied to as an individual for relevant information in such matters, since the public does not know that a proper mechanism is being slowly developed with us, though, compared with that of some American universities, it is rudimentary. I will further indicate what I mean by mentioning one recent incident. At the centenary celebrations of the London University I was put up to speak for the Australian universities and did my best. Some favourable notices appeared in *Nature*, and then the matter passed out of mind. Later I received a letter from a lady in Illinois, United States of America, who is a graduate of a very large women's university, stating she had read with pleasure the comments on this address, and further, that the college journal was in the hands of some 22,000 graduates. The incident is only significant because it indicates that the college had either sent someone to London or had arranged with someone to report the proceedings. It is this alert American attitude which I admire. If there is any new development, they do not

hastily adopt it, but they examine it carefully, and I hope that is the attitude we shall adopt.

If the extension movement is developed, as I think and hope it will be, the public will turn to the university for information and guidance in many directions and a great forward move will be made. Every citizen should be regarded as a potential student and given every facility to obtain any information he or she desires.

The university outlook should mean a careful examination of new proposals and a realization that a stationary university is going backward, as we are living in a world of rapid change and must change with it, but, as Childs put it, not be subjugated by it. If these alterations are effected I shall feel that a great and broad-based university is in sight.

But in conclusion may I say that I should be wanting in deep feeling if I failed to acknowledge the action of the students since my retirement from the chancellorship. They have definitely and in a practical form thanked me for such efforts as I have made to help them. I hope to continue these activities. Nothing has moved me more deeply than their kindness, both with regard to my late wife, who did her best, and myself, and their appreciation of such efforts as we were able to make. All that I can say is that we worked hard and did all that seemed possible, and that it is with a full heart that I thank them. The kindly messages sent to me by members of the staff and the ceremony today add to the feeling of gratitude and my desire as a member of council to do all I can for the University of Melbourne. *May postera crescam laude* be a permanent factor in our mental life. And may I, on such an occasion as this, be permitted to be personally retrospective and reminiscent for a final moment. As my thoughts move backward and I recall the great characters and valued friends who served this university, and whom I have in most cases outlived, I feel inclined to quote ten lines taken from Goethe's "Dedication to Faust", in which the great poet sounded his highest note:

Again in deepening beauty ye float near
Forms dimly imaged in the days gone by,
Pictures you bring with you of happy years,
Loved shades of other days are rising fast.
First love and early friendship reappears
Like half remembered legends of the past,
But ah! they cannot hear my closing song,
These hearts for whom its earlier notes were tried;
Departed is alas the friendly throng
And dumb the echoes all that first replied.

Proceedings of the Australian Medical Boards.

QUEENSLAND.

THE undermentioned have been registered, pursuant to the provisions of *The Medical Acts, 1925 to 1935*, of Queensland, as duly qualified medical practitioners:

- Bradley, Henry Houghton Burton, M.B., B.S., 1937 (Univ. Sydney), Rockhampton.
- Brody, Jancsi, L.R.C.P. and S. (Edinburgh), L.R.F.P. and S. (Glasgow), 1939, Brisbane.
- Cohn, Walter, L.R.C.P. and S. (Edinburgh), L.R.F.P. and S. (Glasgow), 1939, Brisbane.
- Goldberger, Giacomo, M.D., 1931 (Padua), Brisbane.
- Guastalla, Piero Bruto, M.D., 1936 (Rome), Brisbane.
- Gunther, William Willis, M.B., 1938 (Univ. Sydney), Ingleburn.
- Morrow, John, M.B., B.S., 1937 (Univ. Melbourne), Gympie.
- Mowat, John Kenneth, M.B., B.S., 1935 (Univ. Sydney), Brisbane.
- Weyman, Irwin James, M.D., 1928 (Genoa), Brisbane.
- Woodruff, Phillip Scott, M.B., B.S., 1939 (Univ. Melbourne), Mackay.

TASMANIA.

THE undermentioned has been registered, pursuant to the provisions of the Medical Act, 1918, of Tasmania, as a duly qualified medical practitioner:

Jolly, Alexander Thomas Hicks, M.B., B.S., 1935 (Univ. Melbourne), Brisbane Street, Launceston.

Books Received.

- THE PRACTITIONER'S POCKET-BOOK, by D. S. Davies, D.M., F.R.C.S.; 1939. London: John Bale Medical Publications Limited. Demy 18mo, pp. 266. Price: 7s. 6d. net.
- AN INTRODUCTION TO PATHOLOGY AND BACTERIOLOGY FOR MEDICAL STUDENTS IN THE TROPICS, by E. C. Smith, B.A., M.D., D.P.H., Sc.D., M.R.C.P., M.R.C.P.I., D.T.M. and H.; 1939. London: John Bale Medical Publications Limited. Medium 8vo, pp. 291, with illustrations. Price: 15s. net.
- PATHOLOGY: AN INTRODUCTION TO MEDICINE AND SURGERY, by J. H. Dible, M.B., F.R.C.P., and T. B. Davie, B.A., M.D., M.R.C.P.; 1939. London: J. and A. Churchill Limited. Super royal 8vo, pp. 941, with 374 illustrations, including 8 plates in colour. Price: 36s. net.
- CONGENITAL HEART DISEASE, by J. W. Brown, M.D., M.R.C.P.; 1939. London: John Bale Medical Publications Limited. Demy 8vo, pp. 276, with illustrations. Price: 21s. net.
- THE CURE OF ACUTE AND CHRONIC INFECTIONS BY ACTIVE IMMUNIZATION, by W. M. Crofton, M.D.; 1939. London: John Bale Medical Publications Limited. Foolscap 4to, pp. 127, with illustrations. Price: 7s. 6d. net.
- MALNUTRITION IN SOUTH AFRICA, by E. M. Radloff, B.Sc., Ph.D., and T. W. E. Osborn, D.Phil., D.Sc., L.R.C.P., M.R.C.S.; 1939. Johannesburg: The Witwatersrand University Press. Demy 4to, pp. 36. Price: 2s. 6d. net.
- ILLUSTRATIONS OF SURGICAL TREATMENT, INSTRUMENTS AND APPLIANCES, by E. L. Farquharson, M.D., F.R.C.S.E., with a foreword by Sir John Fraser, M.C., M.D., Ch.M., F.R.C.S.E.; 1939. Edinburgh: E. and S. Livingstone. Medium 8vo, pp. 349, with illustrations. Price: 20s. net.
- COMBINED TEXTBOOK OF OBSTETRICS AND GYNÆCOLOGY FOR STUDENTS AND MEDICAL PRACTITIONERS, revised and rewritten by J. M. Kerr, LL.D., M.D., F.R.F.P. and S., F.R.C.O.G., R. W. Johnstone, C.B.E., M.A., M.D., M.R.C.P., F.R.C.S., F.R.C.O.G., J. Hendry, M.B.E., M.A., B.Sc., M.B., F.R.F.P. and S., F.R.C.O.G., D. Baird, B.Sc., M.D., D.P.H., F.R.C.O.G., J. Young, D.S.O., M.D., F.R.C.S., F.R.C.O.G., D. McIntyre, M.B.E., F.R.F.P. and S., F.R.C.S., F.R.C.O.G., F.R.S.E., and E. C. Fahmy, M.B., F.R.C.P., F.R.C.S., F.R.C.O.G., with contributions by C. McNeill, M.A., M.D., F.R.C.P., and G. J. Wilson, M.B., D.P.H.; Third Edition; 1939. Edinburgh: E. and S. Livingstone. Medium 8vo, pp. 1204, with illustrations. Price: 37s. 6d. net.
- FIRST AID AT A GLANCE, by W. H. London, with a foreword by F. A. Maguire, C.M.G., D.S.O., V.D., M.D., F.R.C.S.; 1939. Australia: Angus and Robertson Limited. Foolscap 8vo, pp. 181, with illustrations. Price: 2s. net.

Diary for the Month.

- JAN. 8.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
- JAN. 9.—New South Wales Branch, B.M.A.: Council Quarterly.
- JAN. 9.—Tasmanian Branch, B.M.A.: Branch.
- JAN. 16.—Queensland Branch, B.M.A.: Council.
- JAN. 24.—Victorian Branch, B.M.A.: Council.
- JAN. 24.—Queensland Branch, B.M.A.: Council.
- JAN. 26.—Tasmanian Branch, B.M.A.: Council.

Medical Appointments Vacant, etc.

For announcements of medical appointments vacant, assistants, locum tenentes sought, etc., see "Advertiser", pages xlii-xv.

CHILDREN'S HOSPITAL (INC.), PERTH, WESTERN AUSTRALIA: Junior Resident Medical Officers.

MILDURA BASE HOSPITAL, MILDURA, VICTORIA: Medical Superintendent.

ROYAL SOUTH SYDNEY HOSPITAL, ZETLAND, NEW SOUTH WALES: Honorary Surgeon.

TAMWORTH BASE HOSPITAL, TAMWORTH, NEW SOUTH WALES: Pathologist.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment referred to in the following table without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

BRANCHES.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 135, Macquarie Street, Sydney.	Australian Natives' Association. Ashfield and District United Friendly Societies' Dispensary. Balmmain United Friendly Societies' Dispensary. Leichhardt and Petersham United Friendly Societies' Dispensary. Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney. North Sydney Friendly Societies' Dispensary Limited. People's Prudential Assurance Company Limited. Phoenix Mutual Provident Society.
VICTORIAN: Honorary Secretary, Medical Society Hall, East Melbourne.	Associated Medical Services Limited. All Institutes or Medical Dispensaries. Australian Prudential Association, Proprietary, Limited. Federated Mutual Medical Benefit Society. Mutual National Provident Club. National Provident Association. Hospital or other appointments outside Victoria.
QUEENSLAND: Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17.	Brisbane Associate Friendly Societies' Medical Institute. Proserpine District Hospital. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.
SOUTH AUSTRALIAN: Secretary, 178, North Terrace, Adelaide.	All Lodge appointments in South Australia. All Contract Practice Appointments in South Australia.
WESTERN AUSTRALIAN: Honorary Secretary, 295, Saint George's Terrace, Perth.	Wiluna Hospital. All Contract Practice Appointments in Western Australia.

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ILLUSTRATIONS TO THE ARTICLE BY DR. A. A. ABBIE.

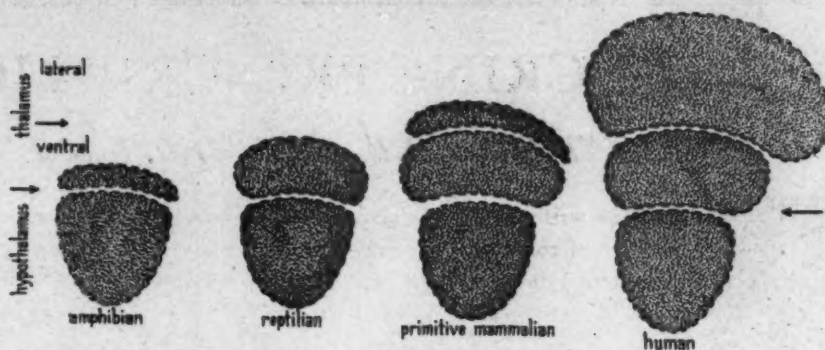


FIGURE I.

Schema to illustrate the evolution of diencephalic levels. The epithalamus is not included. (Not to scale.)

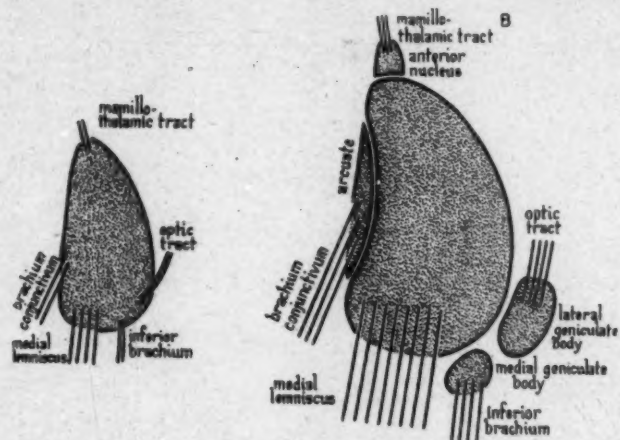


FIGURE II.

Differentiation of the nuclei of the ventral group from a single cell mass under the influence of specific afferent impulses. (After Abbie, 1932)

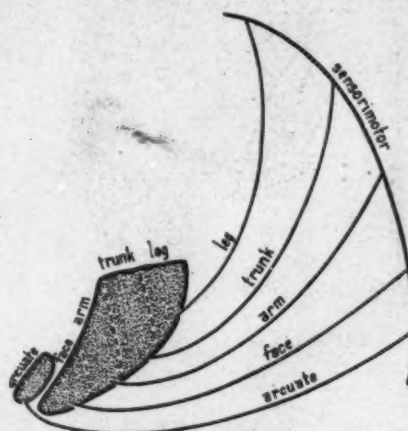


FIGURE III.

Topographical projection from the arcuate and ventral nuclei on the sensorimotor cortex. (After Sachs, Le Gros Clark, Dussier de Barenne, Earl Walker and others.)

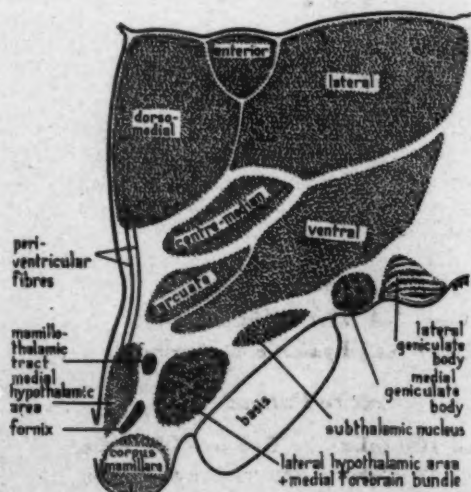


FIGURE IV.

The chief cell masses of the diencephalon. A composite figure derived from sections through the anterior, middle and posterior regions of the diencephalon.

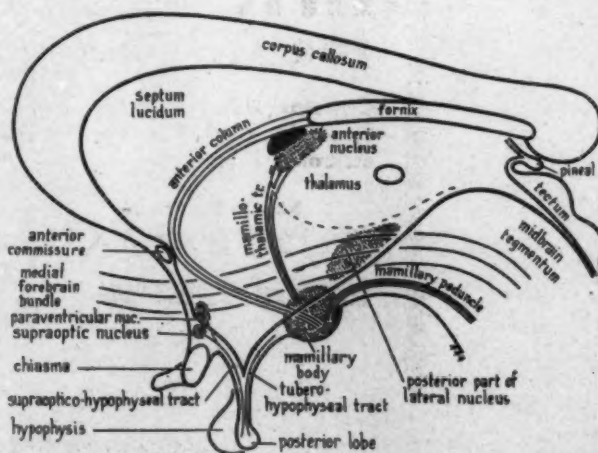


FIGURE V.

Some of the cell masses and fibre tracts of the hypothalamus as seen in sagittal section.

ILLUSTRATIONS TO THE ARTICLE BY DR. A. A. ABBIE.

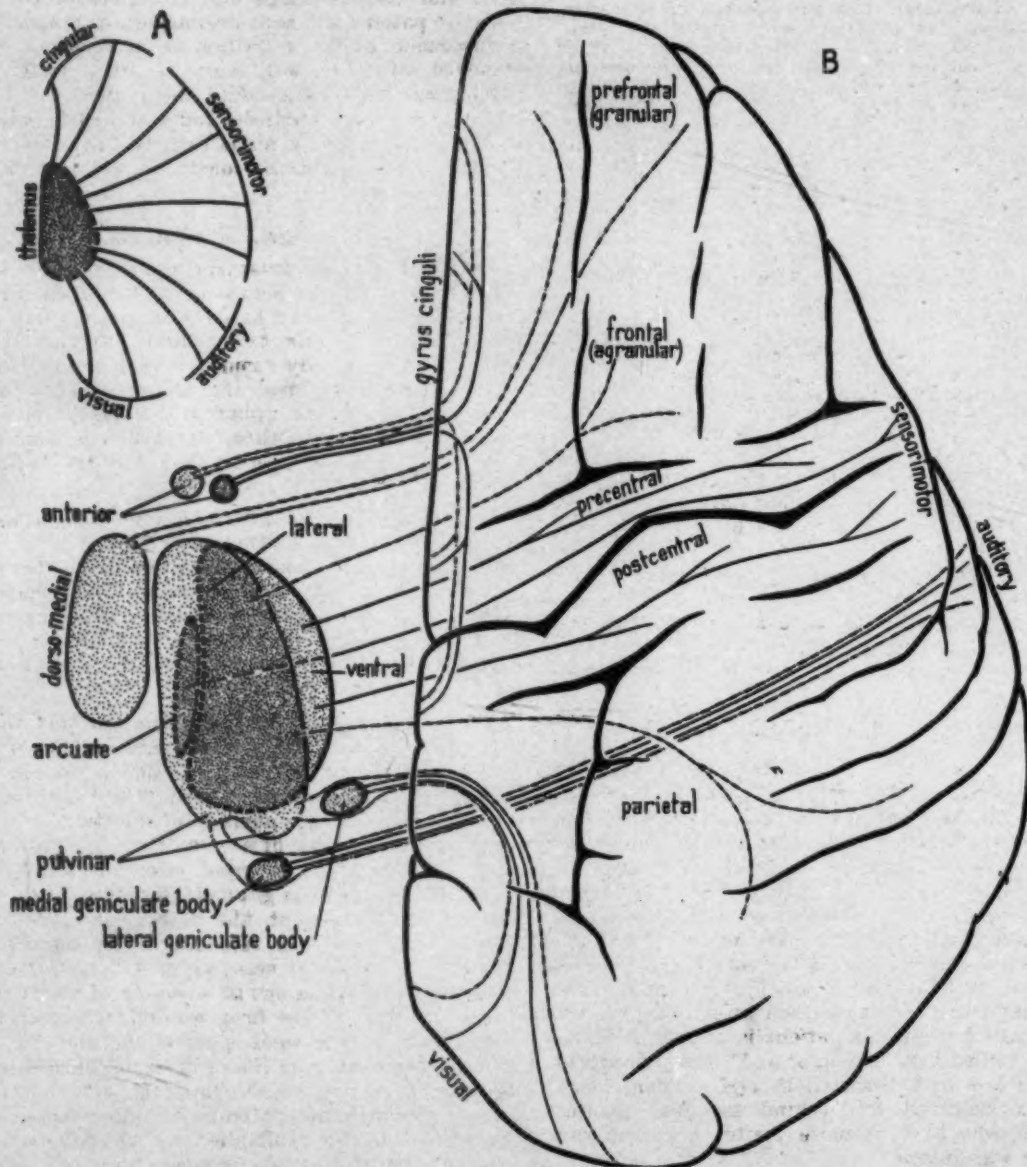


FIGURE VI.

A: Primitive thalamo-cortical connexions as envisaged by Elliot Smith.⁶⁸ Note the direct projection. B: The main thalamo-cortical connexions in the human brain, chiefly after Le Gros Clark.⁶⁹ The lateral nucleus and the pulvinar are shown as partly covering the arcuate and ventral nuclei. Unbroken lines represent projections from the ventral nuclei, broken lines those from the lateral group. All thalamo-cortical connexions are probably of the "two-way" type. Note that this is simply an extension of the principle of Elliot Smith.

ILLUSTRATIONS TO THE ARTICLE BY DR. A. T. H. JOLLY.

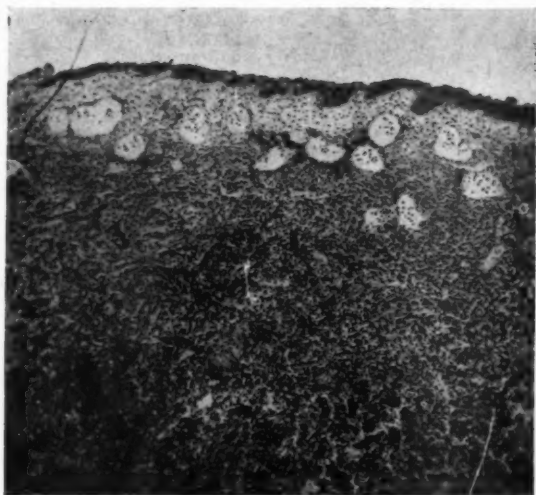


FIGURE I.

A skin nodule from Case I, showing invasion of the dermis, with clear lymphatic spaces produced by obstruction. (x 50.)



FIGURE II.

A skin nodule from Case II, showing invasion of the dermis. (x 50.)

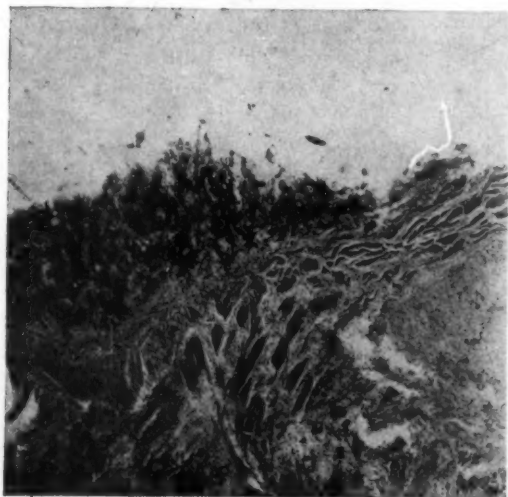


FIGURE III.

A section from Case II at the junction of normal and malignant mucous membrane, showing considerable invasion of the muscle coat. The normal transitional epithelium has desquamated. (x 26.)

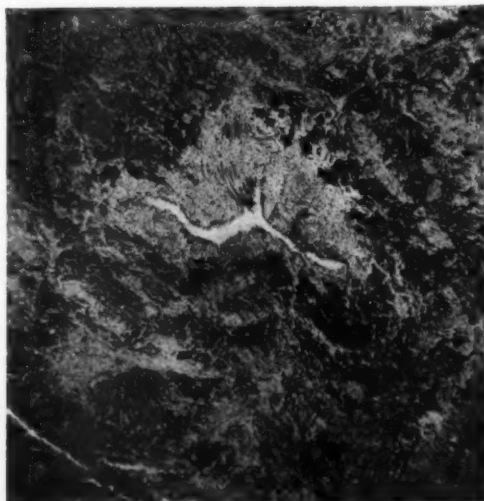


FIGURE IV.

A section from Case II through the ureter on the posterior aspect of the bladder. A sheath of malignant cells is shown surrounding and partly invading the muscle coat. The transitional epithelium has desquamated. (x 26.)

ILLUSTRATIONS TO THE ARTICLE BY DR. A. M. HUTSON.



FIGURE I.

Illustrating the importance of the trial of pneumothorax preceding thoracoplasty. Some months after the induction of right-sided artificial pneumothorax. The mediastinum is mobile and considerably displaced to the left. A pleural hernia is visible as a ring shadow, extending into the left side of the chest. The large cavity in the right upper lobe is held open by numerous adhesions.

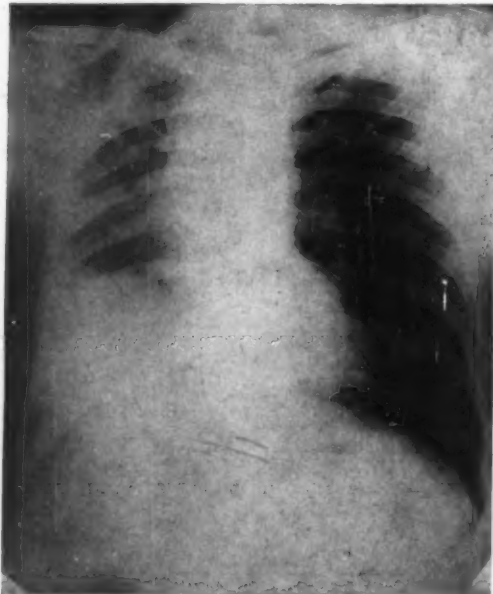


FIGURE II.

Five months after the pneumothorax was abandoned and the right phrenic nerve divided. The mediastinum is now pulled to the right, the diaphragm has risen and the cavity has become much smaller.



FIGURE III.

The cavity has been obliterated by a postero-lateral thoracoplasty, including seven ribs.

ILLUSTRATIONS TO THE ARTICLE BY DR. ARTHUR CARRODUS AND DR. ADOLPH BOLLIGER.

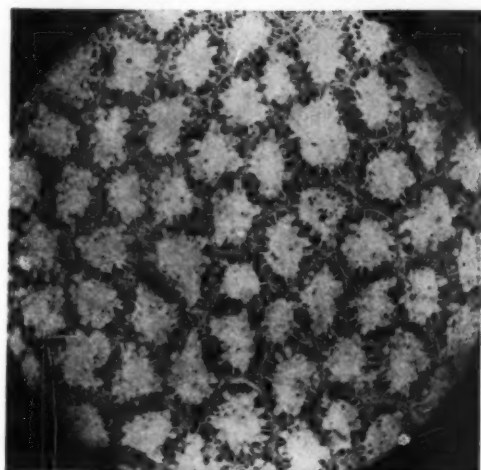


FIGURE III.
High-power field of acini of untreated possum prostate. The acini are lined by columnar epithelium (zone A).
x 75.

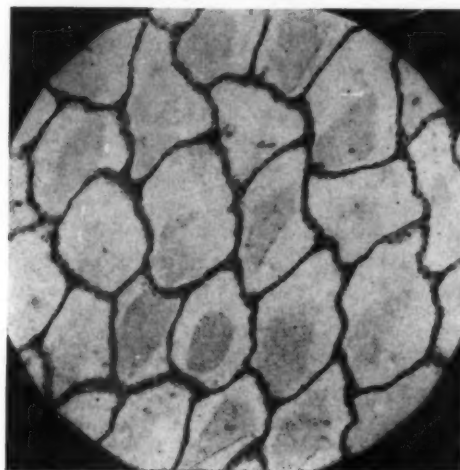


FIGURE IV.
High-power field of tubules of untreated possum prostate (zone B). The tubules are lined by low cubical to flattened epithelium and contain secretion.
x 75.



FIGURE Va.
Zone A of prostate of possum 8 treated with oestrin, showing marked interstitial fibrosis, hyperplasia and squamous metaplasia. Magnified x 75.

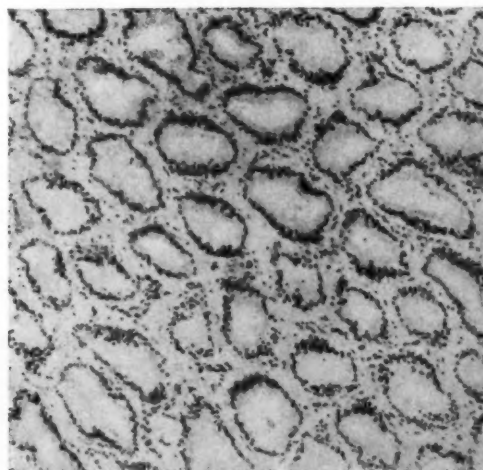


FIGURE Vb.
High-power field of zone B in possum 7 treated with oestrogen, showing epithelial hyperplasia and interstitial fibrosis. Magnified 75 times.

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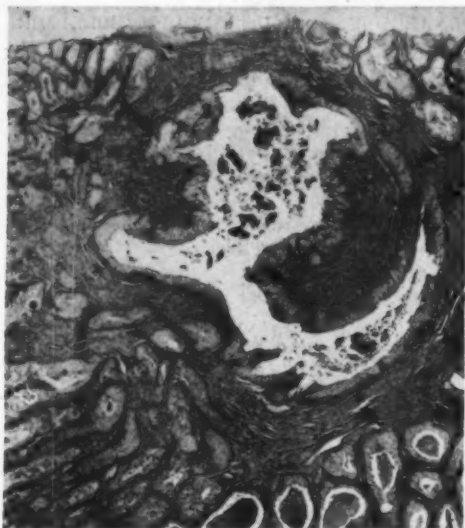


FIGURE VI.

Possum 10. Section illustrates fibrosis, squamous metaplasia, cystic spaces containing desquamated cells and keratin, and the urethral papilloma. $\times 75$.

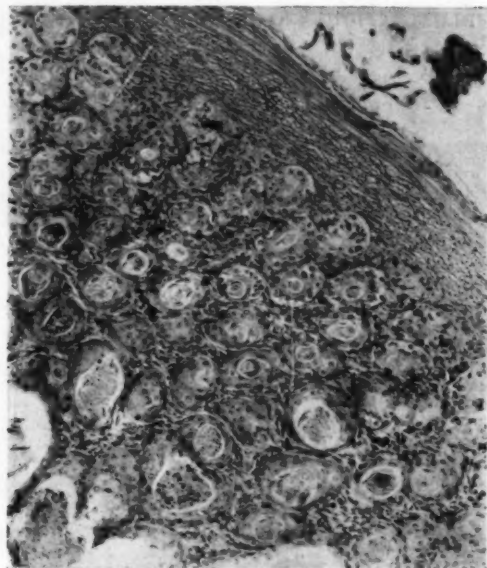


FIGURE VII.

Possum 10. High-power field of zone B, showing squamous metaplasia and cystic spaces containing keratin and desquamated cells and polymorphonuclear leucocytes and interstitial fibrosis. $\times 75$.



FIGURE XI.

Possum 8. Section illustrates the fibrosis around the urethra, ejaculatory ducts, throughout zone A and to a less extent in zone B.

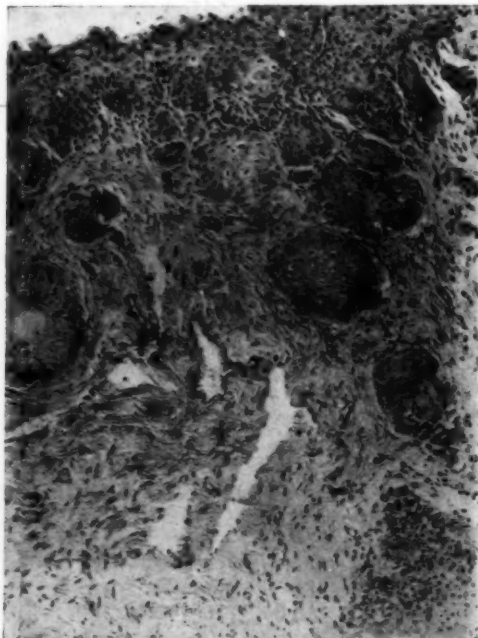


FIGURE XII.

Possum 10. Section shows precarcinomatous changes as shown by invasion of the subepithelial tissues by groups of epithelial cells.

ILLUSTRATIONS TO THE ARTICLE BY PROFESSOR C. G. LAMBIE.

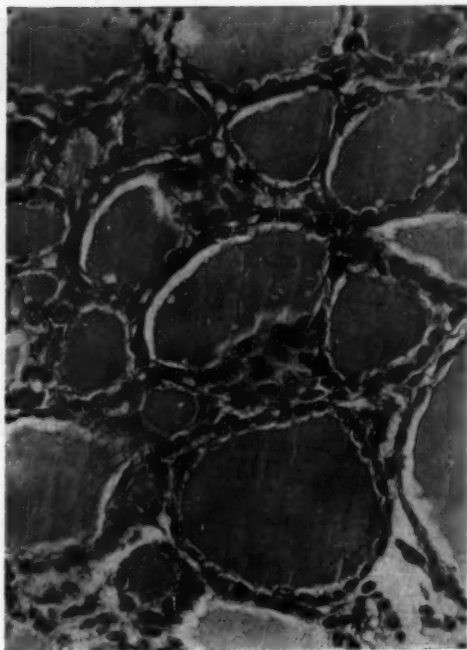


FIGURE I.
Stage "-". Resting gland in reaction of guinea-pig's thyroid to thyrotrophic hormone. Magnification about $\times 400$.

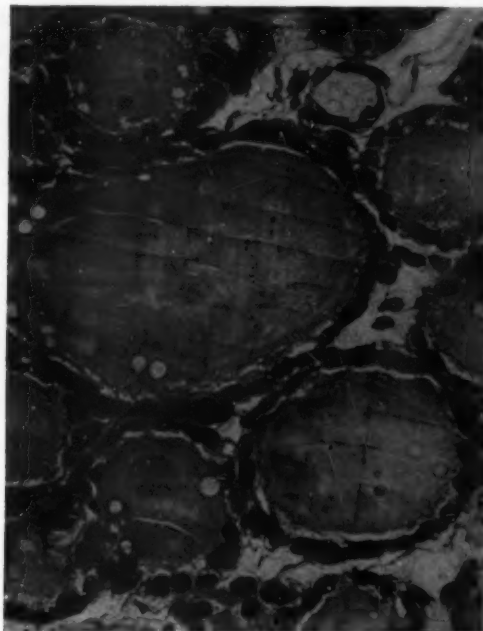


FIGURE II.
Stage "+". Commencing activity in reaction of guinea-pig's thyroid to thyrotrophic hormone. Marginal vacuolation, epithelium flattened. Magnification about $\times 400$.

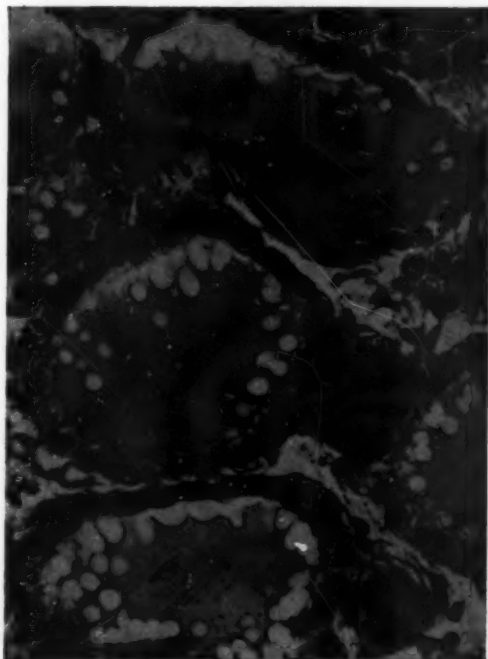


FIGURE III.
Stage "+ +". Slight activity in reaction of guinea-pig's thyroid to thyrotrophic hormone. Epithelium cuboidal. Magnification about $\times 400$.

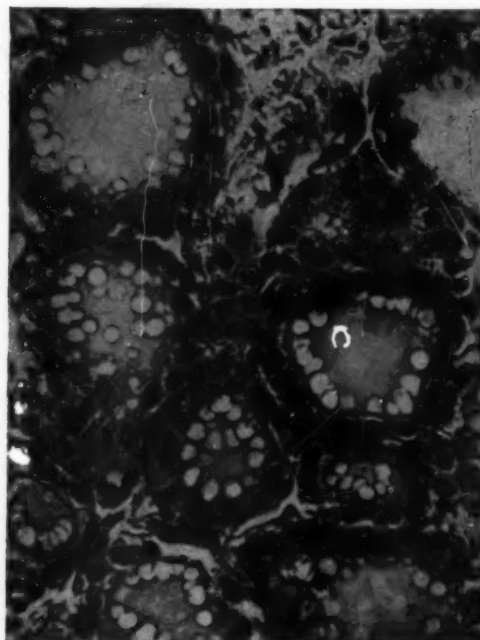


FIGURE IV.
Stage "+ + +". Definite activity in reaction of guinea-pig's thyroid to thyrotrophic hormone. Epithelium cubical. Magnification about $\times 400$.

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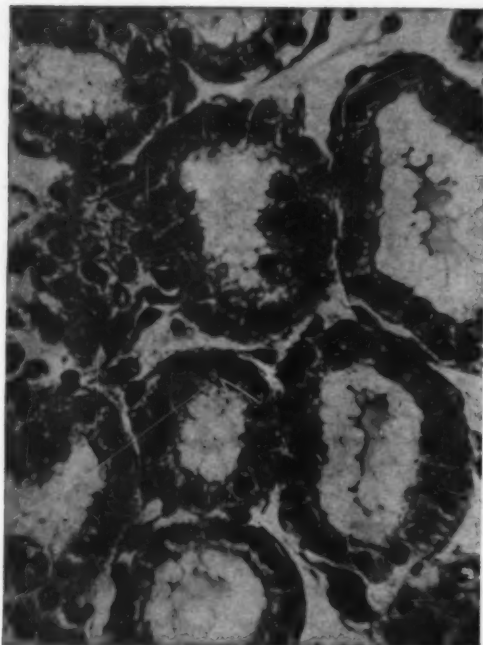


FIGURE V.
Stage "++++". Marked activity in reaction of guinea-pig's thyroid to thyrotrophic hormone. Epithelium semi-columnar. Magnification about $\times 400$.

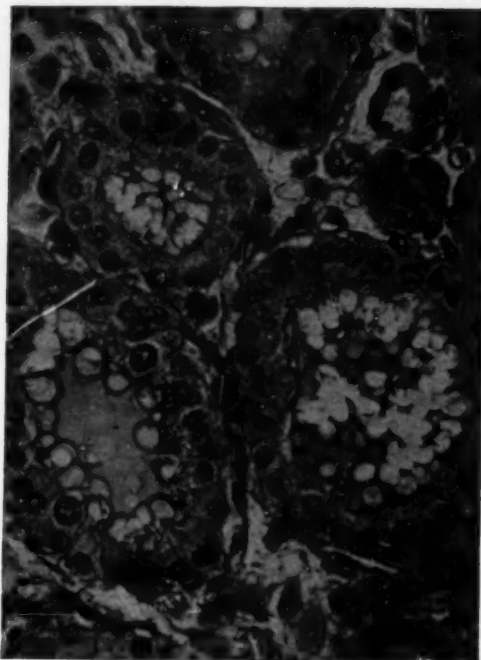


FIGURE VI.
Stage "++++". Very marked activity in reaction of guinea-pig's thyroid to thyrotrophic hormone. Epithelium columnar. Magnification about $\times 400$.

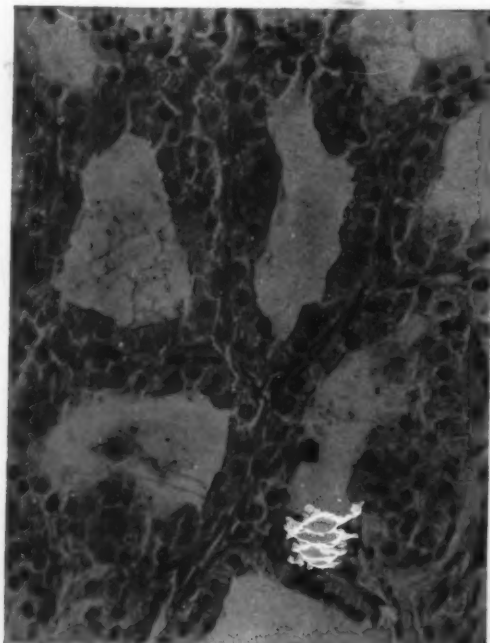


FIGURE VII.
Stage "++++". Very marked activity and resorption of colloid in reaction of guinea-pig's thyroid to thyrotrophic hormone. Magnification about $\times 400$.

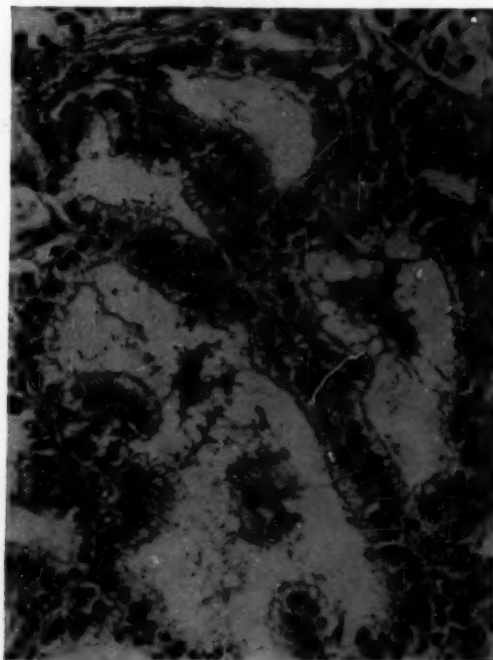


FIGURE VIII.
Section of thyroid gland from case of Graves's disease. Compare with Figure VII.

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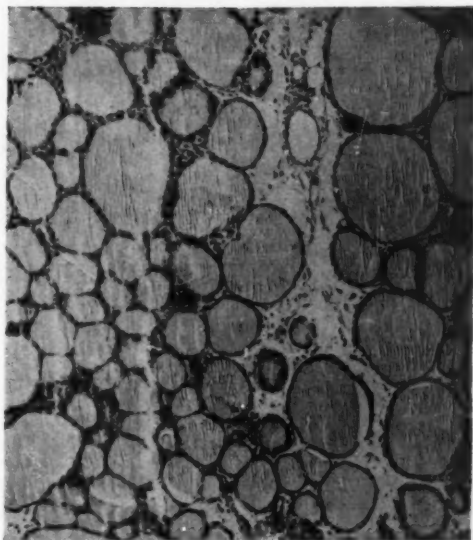


FIGURE IX.
Involved thyroid of guinea-pig in refractory state following continuous administration of thyretrophic hormone over two months.

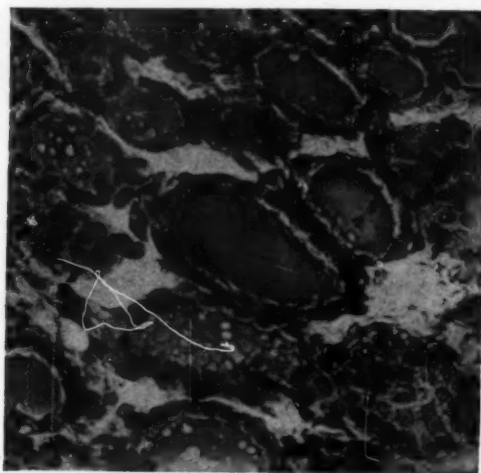


FIGURE XII.
Illustrating inhibitory effect of ascorbic acid. Thyroid of guinea-pig after six days' administration of 100 milligrammes of ascorbic acid + five units of thyretrophic hormone on fifth and sixth days. Magnification $\times 400$.

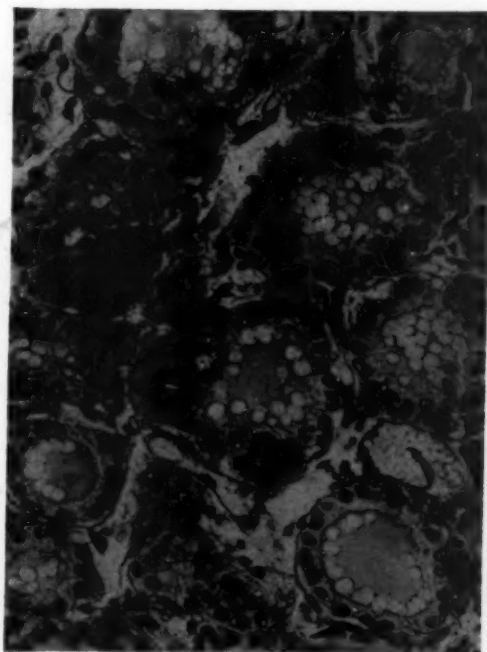


FIGURE XI.
Thyroid of guinea-pig after two injections of five units of thyretrophic hormone. Compare Figures XII and XIII. Magnification $\times 400$.

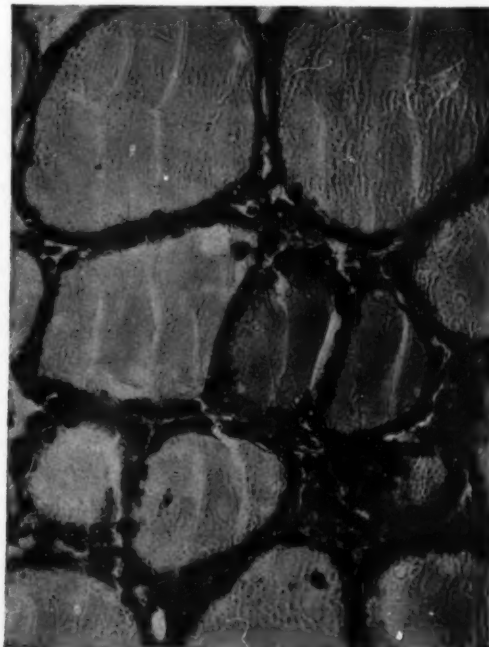


FIGURE XIII.
Illustrating inhibitory effect of antithyretrophic serum. Thyroid of guinea-pig after six days' administration of antithyretrophic serum from rabbit (rendered resistant by repeated injections of extract of ox pituitary) + five units of thyretrophic hormone. Magnification $\times 400$.

ILLUSTRATIONS TO THE ARTICLE BY DR. JAMES F. HUGHES.



FIGURE I.
Pelvis and femur before operation, showing intensive decalcification, cystic change and deformation of femoral neck as a result of pathological fracture.



FIGURE II.
Scapula and thoracic wall, before operation, showing decalcification and cystic change.

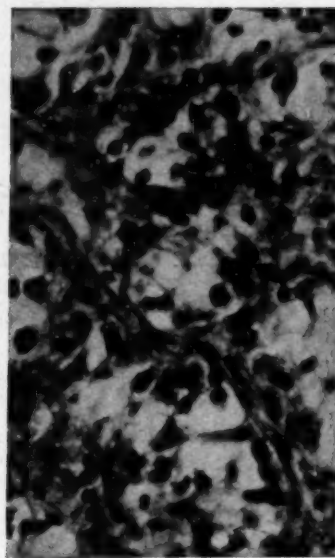


FIGURE V.
Photomicrograph of parathyroid tumour removed at operation, showing cells of parathyroid type (mainly principal or chief cells) arranged in an acinar fashion. Between these groups of cells run fibrous tissue septa and supported blood vessels.

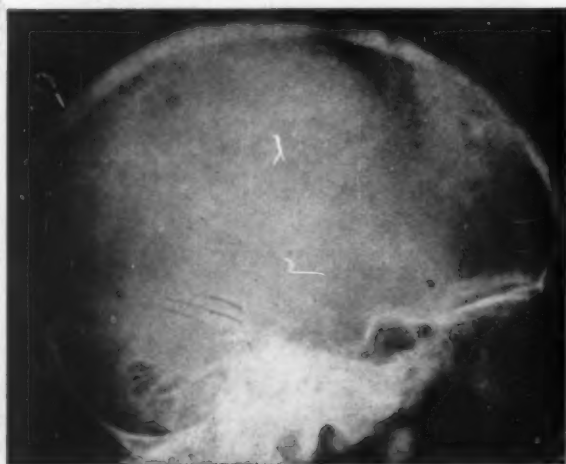


FIGURE III.
Skull before operation, showing decalcification and bone destruction (lateral view).

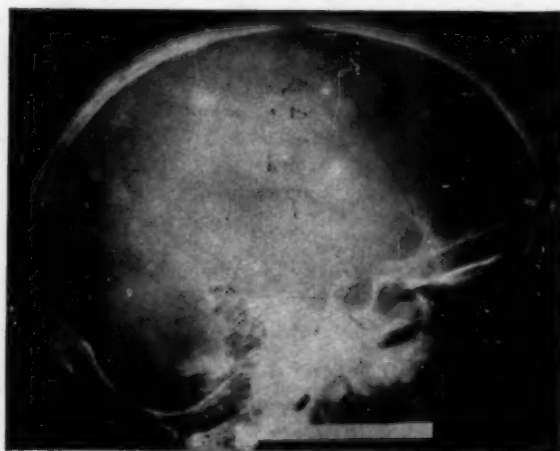


FIGURE IV.
Skull after operation, showing extraordinary reversion to normal appearance. Extensive deposition of calcium has occurred (lateral view).

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VOL. II.—26TH YEAR.

SYDNEY, SATURDAY, DECEMBER 30, 1939.

No. 27.

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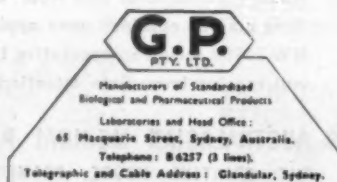
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